CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
REGIONAL WATER QUALITY CONTROL BOARD
COLORADO RIVER BASIN REGION

DRAFT

PATHOGEN
TOTAL MAXIMUM DAILY LOAD
FOR THE NEW RIVER

April 12, 2001

Prepared by:
Regional Board Staff
Watershed Protection Branch

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LIST OF ACRONYMS AND ABBREVIATIONS

AF	Acre-feet
Ag	Agricultural
AFY	Acre-feet per year
BECC	Border Environment Cooperation Commission
BEIF	Border Environment Infrastructure Fund
bgs	Below grade surface
BMPs	Best Management Practices
BTAC	Binational Technical Advisory Committee for New River/Mexicali Sanitation Project
CAFO	Confined Animal Feeding Operation
CalEPA	California Environmental Protection Agency
CEQA	California Environmental Quality Act
CESPM	Comisión Estatal de Servicios Públicos del Estado
CDO	Cease and Desist Order
CFR	Code of Federal Regulations
cfs	cubic feet per second
CILA	Comisión Internacional de Limites y Aguas
Clean Water Act	Federal Water Pollution Control Act
CNA	Comision Nacional del Agua (Mexican National Water Commission)
CRBRWQCB	Colorado River Basin Regional Water Quality Control Board
CWA	Clean Water Act
CWC	California Water Code
DHS	California State Department of Health Services
DGMHP	Date Gardens Mobile Home Park
EAI	Enforcement Action Implementation
E. coli	Escherichia coli bacteria
EWMP	Engineered Waste Project Plan
FCO	Fecal Coliform Organisms
FRSH	Freshwater Replenishment
gal/day	gallons per day
GeoM	Geometric Mean
IBC	International Boundary Commssion
IBWC	International Boundary and Water Commission, United States Section
IND	Industrial Service Supply
INEGI	Instituto Nacional de Estadística Geografía e Informática
IID	Imperial Irrigation District
LA	Load Allocation
MCUSD	McCabe Union School District

mg/L	milligram per liter

ACRONYMS (cont.)

MGD	million gallons per day
ml	milliliter
MPN	Most Probable Number
MSL	Mean Sea Level
NADBank	North America Development Bank
NAFTA	North American Free Trade Agreement
NPDES	National Pollutant Discharge Elimination System
Porter-Cologne Act	California Porter-Cologne Water Quality Control Act
QAPP-NR	Quality Assurance Project Plan for the New River
RARE	Preservation of Rare, Threatened, or Endangered Species
REC I	Water Contact Recreation
REC II	Non-contact Water Recreation
RWQCB	Regional Water Quality Control Board
SAHOPE	Secretaría de Asentamientos Humanos y Obras Públicas del Estado
SCWD	Seeley County Water District
SEDESOL	Secretaría de Desarrollo Social
SEDUE	Secretaría de Desarrollo Urbano y Ecología
SWDS	Solid Waste Disposal Site
SWRCB	State Water Resources Control Board
TCO	Total Coliform Organisms
TMDL	Total Maximum Daily Load
TSO	Time Schedule Order
SSA	Salton Sea Authority
UCCE	University of California Cooperative Extension
USBR	United States Bureau of Reclamation
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WARM	Warm Freshwater Habitat
WDR	Waste Discharge Report
WDS	Workplan Development and Submittal
WILD	Wildlife Habitat
WLA	Waste Load Allocation
WQO	Water Quality Objective
WQS	Water Quality Standard
WWTP	Waste Water Treatment Plant

EXECUTIVE SUMMARY

INTRODUCTION

The New River, a water of the United States, is in the southeastern portion of the Salton Sea Transboundary Watershed and is one of the main tributaries to the Salton Sea, which is California's largest inland surface water and also a water of the United States. This part of the watershed is characterized by an arid environment (less than 3 inches per year of average precipitation) and highly productive irrigated farmland. The New River carries partially treated and untreated wastes from the Mexicali Valley across the International Boundary into the United States. It also receives treated disinfected and undisinfected domestic wastewater from wastewater treatment plants in the Imperial Valley. Most of its flow, however, consists of agricultural return flows, also from the Imperial Valley. The New River is severely polluted by pathogens as indicated by fecal coliforms and Escherichia coli (E. coli) bacteria. These bacteria are present in the discharges of wastes from the Mexicali Valley in Mexico and discharges of treated but undisinfected wastewater from some Imperial Valley wastewater treatment plants.

The California Regional Water Quality Control Board, Colorado River Basin Region (hereafter "Regional Board") is charged by the California Water Code (CWC) with protecting the quality of the waters of the region. The Regional Board, a California Environmental Protection Agency, is also responsible for implementing the pollution control measures required by the Federal Clean Water Act (CWA) for the waters of the United States within the region. In 1998, and pursuant to CWA Section 303(d), the Regional Board listed the New River as water quality impaired by high concentrations of bacteria. CWA Section 303(d) also requires the State to establish Total Maximum Daily Loads (TMDLs) for pollutants causing water quality impairments for all waterbodies identified as water quality impaired. A TMDL is pollutant specific and consists of the maximum amount of the pollutant that a waterbody can assimilate and still meet its beneficial uses.

PROPOSED TMDL

This proposed Pathogen TMDL identifies the total allowable concentrations of fecal coliforms and E. coli bacteria for sources discharging wastes into the New River, such that, when the allowable loads are implemented, they are expected to eliminate the impairments bacteria are currently causing. While this TMDL is expressed in the form of fecal coliforms, E. coli, and enterococci bacteria, the bacteria water quality objectives established by the Regional Board and the targets and allocations proposed in this TMDL address pathogenic microorganisms in general[1] (e.g., bacteria, viruses, and fungi). Specifically, this TMDL:

- Identifies the bacteria loading problems/issues that prompted TMDL development;

[1] Fecal coliforms and E. coli bacteria are being used as the indicator microorganisms in the Region until better and similarly practical tests become readily available in the Region to more specifically target pathogens.

- Specifies in-stream numeric targets for concentrations of pathogenic indicator micro-organisms for the river;
- Analyzes the sources of pathogens causing the impairment;
- Allocates allowable loads for the sources of pathogens;
- Links the water quality standards and the TMDL; and
- Includes an Implementation Plan for the TMDL.

Table No. E.1, below, summarizes the technical components of this TMDL.

Table E.1: New River Pathogen TMDL Summary

<table>
<tr><th>ELEMENT</th><th>DESCRIPTION</th></tr>
<tr><td>Problem Statement
(impaired water quality standard)</td><td>The New River headwaters start about 20 miles south of Calexico in the Mexicali Valley, Mexico. Bacteria, which are pathogen-indicator organisms, impair the entire segment of the New River in the United States. Pollution is severest at the International Boundary due to discharges of wastes from Mexico. The fecal coliforms and E. coli bacteria concentrations exceed the water quality objectives established to protect mainly the water contact and non-water contact recreational beneficial uses of the New River.</td></tr>
<tr><td>Numeric Target</td><td>The following are the in-stream numeric water quality targets for this TMDL:
<table>
<tr><th>Indicator Parameters</th><th>30-day Geometric Mean[a]</th><th>Maximum</th></tr>
<tr><td>Fecal Coliforms</td><td>200 MPN[b]/100 ml</td><td>c</td></tr>
<tr><td>E. Coli</td><td>126 MPN/100 ml</td><td>400 MPN/100 ml</td></tr>
<tr><td>Enterococci</td><td>33 MPN/100 ml</td><td>100 MPN/100 ml</td></tr>
</table>
a. Based on a minimum of no less than 5 samples equally spaced over a 30-day period.
b. Most probable number.
c. No more than 10% of total samples during any 30-day period shall exceed 400 MPN/100 ml.</td></tr>
<tr><td>Source Analysis</td><td>The main sources of pathogens as indicated by fecal coliforms and E. coli bacteria in the New River are discharges of municipal wastes from the Mexicali Valley in Mexico and undisinfected but treated wastewater discharges from five domestic wastewater treatment plants in the Imperial Valley. Natural sources of pathogens seemingly play a relatively insignificant role, but their actual contribution, the contribution from confined animal feeding operations, and the contribution from other nonpoint sources of pollution in general need to be properly characterized.</td></tr>
</table>

ELEMENT	DESCRIPTION
Allocations and Margin of Safety	Discharges from point sources and nonpoint sources of pollution shall not exceed the following waste load allocations (WLAs) and load allocations (LAs), respectively: **WLAs and LAs** **Indicator Parameters** / **30-Day Geometric Mean[a]** / **Maximum** Fecal Coliforms / 200 MPN[b]/100 ml / c E. coli / 126 MPN/100 ml / 400 MPN/100 ml Enterococci / 33 MPN/100 ml / 100 MPN/100 ml a. Based on a minimum of no less than 5 samples equally spaced over a 30-day period. b. Most probable number. c. No more than 10% of total samples during any 30-day period shall exceed 400 MPN/100 ml. The allocations are applicable throughout the entire stretch of the New River in the U.S. The numeric target concentrations are based on extensive epidemiological studies conducted, amongst others, by the USEPA. The studies are based on risk analyses, which implicitly contain a margin of safety. An additional implicit margin of safety is included in this TMDL, as dilution from agricultural return flows and industrial discharges was not factored in the selection of the target. Therefore, the concentrations are considered to contain an adequate margin of safety
Linkage and Loading Capacity	Because most of the pathogenic pollution comes from Mexico and domestic WWTPs in the Imperial Valley, it is believed that direct and indirect controls on these sources should result in attainment of the bacterial WQOs and address the impairment they are causing. While the temporal variability of the river's bacterial concentrations is currently unknown and needs to be determined pursuant to this TMDL, spatial data obtained during recent sampling events are quite promising with regards to the river's ability to assimilate fecal bacteria. As the river travels for about 60 miles from the International Boundary to its terminus with the Salton Sea, fecal coliforms and E. coli concentrations seemingly decrease significantly from the millions at the International Boundary to the low one thousands at its terminus with the Sea.

ELEMENT	DESCRIPTION
Implementation Plan	In adopting water quality objectives for water quality control, CWC Section 13242 requires the Regional Board to adopt an implementation plan for achieving the water quality objectives. The Implementation Plan, contained in Section 7 of this TMDL, includes a description of implementation actions, including recommendations for appropriate action by the appropriate agencies/organizations; time schedules for actions to be taken; and a description of the monitoring and surveillance activities to be undertaken to determine progress toward attaining deadlines and milestones. In summary, and regarding the implementation, staff is recommending that: • All NPDES permits for WWTPs discharging into the New River and/or its tributaries require compliance with bacterial effluent limitations that reflect the WLAs. This measure should resolve the impairment caused by WWTPs in Imperial Valley. • Surveillance and enforcement of the existing general NPDES permit for Confined Animal Feeding Operations (CAFOs) to prevent chronic water quality impairments and address the potential acute water quality impairments from CAFOs; • The Regional Board request the U.S. government to develop and submit a proposed plan with actions to be taken to address the pollution from Mexico and ensure compliance with the WLA and LA for the New River at the International Boundary; and • A monitoring program be adopted to assess TMDL implementation and effectiveness and adjust the TMDL as appropriate based on monitoring results.

The California Secretary for Resources has certified the Basin Plan amendment process as exempt from the requirements of the California Environmental Quality Act (Title 14, Section 15251(g) of the California Code of Regulations) to prepare an Environmental Impact Report or Negative Declaration. Attached to this TMDL Report are:

- A discussion of potential economic costs to the WWTPs, and potential sources of funding and technical assistance for TMDL implementation (Section 7.8 of this TMDL);
- The proposed Basin Plan amendment to establish the TMDL (Attachment 1);
- The proposed Regional Board Resolution to adopt the proposed Basin Plan amendment (Attachment 2);
- An Environmental Check List and Check List discussion for the proposed amendment (Attachment 3); and
- An economic analysis of the costs for disinfection (Attachment 4).

The amended Basin Plan, Environmental Checklist, TMDL Report, and supporting documentation are functionally equivalent to an Environmental Impact Report or Negative Declaration pursuant to the California Environmental Quality Act (CEQA).

PHASED TMDL

There are limited data available to calculate and/or estimate the actual pathogenic contributions from nonpoint sources of pollution in the Imperial Valley (e.g., agricultural return flows) and establish appropriate controls if necessary. Preliminary data suggest their contribution is relatively insignificant. This warrants the use of a phased approach as recommended by USEPA Guidance (USEPA 1991). When implementing a phased approach, the numeric target, load allocations, waste load allocations, and margin of safety must be set for both point and non-point sources of pollution. This TMDL consists of two (2) phases. Phase I (2001-2004) focuses on controlling the pathogenic contribution from wastewater treatment plants in the Imperial Valley and the New River at the International Boundary, which are the most significant sources of the bacterial impairments to the New River; and collecting data for source analysis and establishing overall water quality trends. Phase II (2004-2007) will focus on further characterization of the actual pathogenic contribution from nonpoint sources of pollution and development of appropriate controls for these sources as necessary. Successful implementation of Phase I is critical to reduce the pollution to a level that allows for further the identification and characterization of the contribution from the more diffuse sources. The phased approach provides for pollution reduction by major polluters without the delay of new data collection and analysis. The monitoring results for both Phases may also provide an analytical basis for modifying the TMDL. Accordingly, the proposed TMDL also includes a commitment for periodic review and modification of the TMDL elements, as necessary due to new information.

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1. INTRODUCTION

The New River, located in the Salton Sea Transboundary Watershed, has a long history of pollution problems. The development of irrigated agriculture in the Imperial Valley and the population explosion in the City of Mexicali, Mexico (located just south of the Mexican border) have resulted in widespread surface water pollution from manmade sources in the watershed. The New River has been listed on the state's 303 (d) list as impaired by bacteria, pesticides, VOC's, silt, and nutrients. The Salton Sea Transboundary Watershed encompasses over one third of the Region and is the priority watershed for the purposes of watershed management and cleanup. In particular and on a priority basis, the New River has been targeted for development and implementation of a TMDL that addresses pathogens. As reported in the Source Analysis of this report, approximately one-third of the total New River flow consists of untreated/improperly treated wastes (raw sewage being the most detrimental) from point and nonpoint sources of pollution discharging in the Mexicali Valley, Mexico. The bacteria concentrations, indicated by fecal coliforms and Escherichia coli (E. coli), violate water quality standards promulgated in the Regional Board's Basin Plan, and Minute No. 264 of the Mexican-American Water Treaty. The magnitude of the violation is indicative of a serious public health threat and has resulted in the impairment of the New River's designated beneficial uses. In order to regulate this problem, the Regional Board proposes to set waste load and load allocations, in terms of concentration, at 200 MPN/100 ml for fecal coliforms, 126 MPN/100 ml for E. coli, and 33 MPN/100 ml for enterococci. These water quality objectives represent acceptable bacteria concentration levels with respect to the protection of designated beneficial uses and human health. In accordance with the California Water Code, the Regional Board has developed an implementation plan with an accompanying Basin Plan amendment to ensure attainment of the WQO's. Because part of the watershed is located in Mexico, it is important to note that this TMDL only applies to portions of the New River over which the State has jurisdiction. The U.S. federal government is expected to cooperatively address pathogen control with Mexico to ensure TMDL compliance where the New River enters California.

1.1.1 CLEAN WATER ACT SECTION 303(D) LIST AND TMDL PROCESS

Section 303(d)(1)(A) of the Clean Water Act (CWA) requires the California Regional Water Quality Control Board, Colorado River Basin Region (hereafter Regional Board), to:

- Identify the Region’s waters that do not comply with water quality standards (WQS) applicable to such waters;
- Rank the impaired waterbodies, taking into account factors including the severity of the pollution and the uses made of such waters; and
- Establish TMDLs for those pollutants causing the impairments to ensure that impaired waters attain their beneficial uses.

Title 40, Code of Federal Regulations (40 CFR), Section 130.3, defines a water quality standard as the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect those uses, including antidegradation criteria. A TMDL is defined as the sum of the individual waste load allocations (WLAs) for point sources of pollution, plus the load allocations (LAs) for nonpoint sources of pollution and natural background pollution, plus a margin of safety such that the capacity of the waterbody to assimilate pollutant loadings without violating water quality standards is not exceeded. A TMDL can be expressed in terms of either mass per time, toxicity, concentration, a specific chemical, or other appropriate measure. In the case of this TMDL, the most appropriate measure currently available is a density-based measure (concentration) as indicated by fecal coliforms and E. coli results.

The Section 303(d) List identifies the New River as water quality limited, in part, because the concentrations of pathogen-indicator bacteria violate the water quality standards (WQS) established by the Regional Board to protect the beneficial uses of the river. This pathogen TMDL addresses the bacterial impairments of the New River. CWA Section 303(d) and 40 CFR Section 130.0 et seq., specify the components and requirements of a TMDL. Essentially, the TMDL is a numeric target developed to achieve water quality standards and must:

- Show how the TMDL will result in attainment of standards of concern in the specific waterbody;
- Identify and explain the basis for the total allowable load(s) such that the water body loading capacity is not exceeded;
- Identify and explain the basis for individual waste load allocations for point sources and load allocations for nonpoint sources of pollution;
- Explain how an adequate margin of safety is provided to account for uncertainty in the analysis; and
- Account for seasonal variations and critical conditions concerning the flow, loading, and other water quality parameters.

If the State fails to develop a TMDL, or if USEPA rejects the State's TMDL, USEPA must develop one (CWA 303(d) (2), 40 CFR 130.6(c)). Upon approval of the TMDL by USEPA, the State is required to incorporate the TMDL, along with appropriate implementation measures, into the State Water Quality Management Plan (40 CFR 130.6(c)(1), 130.7). The Water Quality Control Plan for the Colorado River Basin (Basin Plan) and applicable statewide plans serve as California's Water Quality Management Plan governing the New and Alamo Rivers and Ag Drains. At a minimum, a TMDL should have the components shown in Table No. 1.1. below:

Table 1.1 Basic Technical TMDL Components

Component	Purpose
Problem Statement	Identifies the context for TMDL development and WQS issues that prompted TMDL development.
Numeric target	Identifies specific instream goals and endpoints for the TMDL, which ensure attainment of applicable WQS.

Component	Purpose
Source Analysis	Characterizes the amount of pollutants entering the receiving water from various sources (e.g., point, nonpoint, and natural sources of pollution).
Loading Capacity Linkage Analysis	Specifies the critical quantitative link between applicable WQS and the TMDL. Loading capacity reflects the amount of a pollutant that may be delivered to the waterbody and still achieve WQS.
TMDL, LAs, WLAs, and Margin of Safety	Provides the calculations for total allowable loads and allocation of these loads among different sources such that applicable WQS are attained, while accounting for seasonal variation and uncertainty in the analysis of the data.
Monitoring Plan	Assesses TMDL implementation and effectiveness, and provides for TMDL adjustment as needed.
Implementation Plan	Specifies nonpoint source Best Management Practices, point source controls, and other actions necessary to implement the TMDL.

Public participation is a cornerstone of the TMDL process. This TMDL is being developed with the benefit of significant public input, including input from the Salton Sea Authority and the Citizens Congressional Task Force for the New River (hereafter “Task Force”). The goal of the Task Force involves addressing overall pollution of the New River. The Task Force includes private citizens and representatives from federal, state, and local governments; educational institutions (e.g., University of California Cooperative Extension at Holtville and Imperial Valley College), and other non-profit organizations. Also, the TMDL is being developed in consultation with United States representatives of the New River/Mexicali Sanitation Project Binational Technical Advisory Committee (BTAC) and of the City of Calexico. The U.S. BTAC committee members are:

- Imperial County,
- Imperial Irrigation District,
- International Boundary and Water Commission (IBWC),
- Regional Water Quality Control Board – Colorado River Basin,
- United States Environmental Protection Agency, and
- State Water Resources Control Board

Additionally, Regional Board staff has also conducted comprehensive public outreach regarding the development and implementation of this TMDL through multiple public presentations and meetings with stakeholders.

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2. PROBLEM STATEMENT

Historically, the New River has been recognized as a significantly polluted surface water body since at least the late 1940s, primarily because of its extremely high concentrations of fecal coliform bacteria and stench at the International Boundary. This problem statement describes the water quality issues that prompted the development of this TMDL in accordance with the State's 303(d) list of impaired water bodies, as well as provides background information of the New River watershed. Recent water quality sampling results from the watershed indicate extremely elevated concentrations of E. coli bacteria, an established water quality indicator of pathogens. These concentrations violate both the narrative and numeric standards promulgated in the *Water Quality Control Plan for the Colorado River Basin Region* (Basin Plan) (CRBRWQCB 1994) and the narrative standards established in Minute No. 264 of the Mexican-American Water Treaty. The violation of these standards indicates the impairment of the designated beneficial uses of the New River due to concentrations of bacteria that create a serious public health hazard. People using the New River for fishing and other recreational activities are at risk of exposing themselves to infectious, disease-causing agents. Wildlife are likewise endangered, perhaps to an even greater extent, because they are unaware of the risks associated with drinking from a river that is inundated daily with raw sewage. There are two major sources of bacteria problems in the New River. First, there are several NPDES facilities operating in the New River watershed that are discharging undisinfected or improperly disinfected wastes in violation of their permits. Second, there is a significant amount of raw sewage and partially treated sewage being discharged into the New River because of the inadequate sewage infrastructure in Mexicali, Mexico.

2.1 WATER QUALITY STANDARDS

Water quality standards (WQS) adopted for the Colorado River Basin Region are contained in the Basin Plan. The WQS for the New River are comprised of the beneficial uses of water and the water quality objectives (which are either numerical or narrative) designed to protect the most sensitive beneficial uses. In the case of the New River, the most sensitive designated beneficial uses to be addressed by this TMDL are contact and non-contact recreation (REC I and REC II). As pathogens enter the food chain, they may also adversely affect other beneficial uses that support wildlife and aquatic habitats. The purpose of this TMDL is to eliminate the impairments that pathogens are causing on the beneficial uses summarized in Table 2.1, below.

Table 2.1 New River Beneficial Uses

Designated Beneficial Uses of Water	Description
Water Contact Recreation (REC I)	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water skiing, skin and scuba diving, surfing, white water activities, fishing, and use of natural hot springs.

Designated Beneficial Uses of Water	Description
Non-Contact Recreation (REC II)	Uses of water for recreational activities involving proximity to water, but not normally involving contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
Freshwater Replenishment (FRSH)	Uses of water for natural or artificial maintenance of surface water quantity or quality.
Industrial Service Supply (IND)	Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well re-pressurization.
Warm Freshwater Habitat (WARM)	Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Wildlife Habitat (WILD)	Uses of water that support terrestrial ecosystems including but not limited to, the preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
Preservation of Rare, Threatened, or Endangered Species (RARE)	Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.

Source: California Regional Water Quality Control Plan for the Colorado River Basin Region (CRBRWQCB 1994)

The Basin Plan prescribes quantitative bacteria water quality objectives applicable to the New River downstream of the International Boundary for public health protection. The standards are specified in terms of E. coli, enterococci, and fecal coliform bacteria. The E. coli and enterococci criteria are based on bacteriological criteria adopted in 1986 by USEPA for fresh waters. Because testing for enterococci is not commercially available in the region, the Regional Board uses the fecal coliform criteria, which have their roots on the secondary disinfection standard promulgated by USEPA in 1973. E. coli is a particular type of fecal coliform bacteria, which are a subgroup of total coliform bacteria. Enterococci are a subgroup of the fecal streptococci. Table 2.2, below, summarizes the Basin Plan quantitative pathogen objectives, which are applicable to the New River immediately downstream of the International Boundary and are addressed by this TMDL.

Table 2.2 REC1 Water Quality Objectives for New River

Indicator Parameter	30-Day Geometric Mean	30-Day Log Mean[a]	Maximum	Other
E. coli	126 MPN[b]/100 ml	--	400 MPN/100 ml	
Enterococci	33 MPN/100 ml	--	100 MPN/100 ml	
Fecal Coliform	--	200 MPN/100ml	--	c

a. Based on a minimum of no less than 5 samples equally spaced over a 30-day period.
b. Most probable number.
c. No more than 10% of total samples during any 30-day period shall exceed 400 MPN/100 ml.

Minute No. 264 of the Mexican-American Water Treaty titled "*Recommendations for Solution of the New River Border Sanitation Problem at Calexico, California - Mexicali, Baja California Norte*" was approved by the Governments of the United States and Mexico effective on December 4, 1980. Minute No. 264 specifies qualitative and quantitative standards for the New River at the International Boundary. However, Minute No. 264 does not contain, among others, a quantitative standard for bacteria at the International Boundary[2]. Therefore, as indicated by the Basin Plan, the Regional Board views the Minute No. 264 standards as interim standards and intends to pursue long-range quantitative standards for the New River at the International Boundary beyond those contained in Minute No. 264. These long-range standards include bacteria WQOs, which are the same as the WQOs applicable to the New River downstream of the International Boundary. They may also include more stringent standards as dictated by the TMDL. Table 2.3, below, shows the narrative water quality objectives of Minute No. 264, which are also being addressed by this TMDL.

Table 2.3 Summary of Minute No. 264 WQOs Addressed by TMDL

Untreated Domestic and Industrial Wastes: The waters of the River shall be free of untreated domestic and industrial waste waters.

[2] Minute No. 264 does contain bacteria objectives of "30,000 colonies per 100 ml, with no single sample exceeding 60,000 colonies per 100 ml". However, these objectives apply to the "New River Upstream of Discharge Canal", which is upstream of the International Boundary (i.e., in Mexico) and outside the jurisdiction of the Regional Board.

Toxic Substances: The waters of the River shall be free from substances that may be discharged into the River as a result of human activities in concentrations which are toxic or harmful to human, animal or aquatic life or which may significantly impair the beneficial uses of such waters.

2.2 HYDROGEOLOGICAL SETTING

2.2.1 NEW RIVER WATERSHED

The New River watershed drains approximately 200,000 acres from the Imperial Valley, the Mexicali Metropolitan area, and approximately 300,000 acres in the Mexicali Valley, Mexico. The river carries urban runoff, untreated and partially treated municipal wastes, untreated and partially treated industrial wastes, and agricultural runoff from the Mexicali Valley northward across the International Boundary into the United States. Within the United States, the New River channel is approximately 60 miles in length and up to 2/3 of a mile in width. Within Mexicali, Baja California, Mexico, this natural channel way is discernible for about 20 miles. From 1980 to 1997, the flow of the river at the border averaged 182,000 acre-feet/year (Tetra Tech, 1999). Once it crosses the International Boundary, the New River flows approximately 60 miles through the Imperial Valley until it reaches its outlet, the Salton Sea. Through the Imperial Valley, the New River acquires about 2/3 of its total flow, mainly in the form of agricultural return flows via agricultural drains owned and operated by Imperial Irrigation District (IID). It also receives treated domestic and industrial wastewater from point sources of pollution. At its outlet with the Salton Sea, the New River flow is about 600 cfs or roughly 434,400 acre-feet/year. Table 2.4, below, shows the estimated flow composition of the New River.

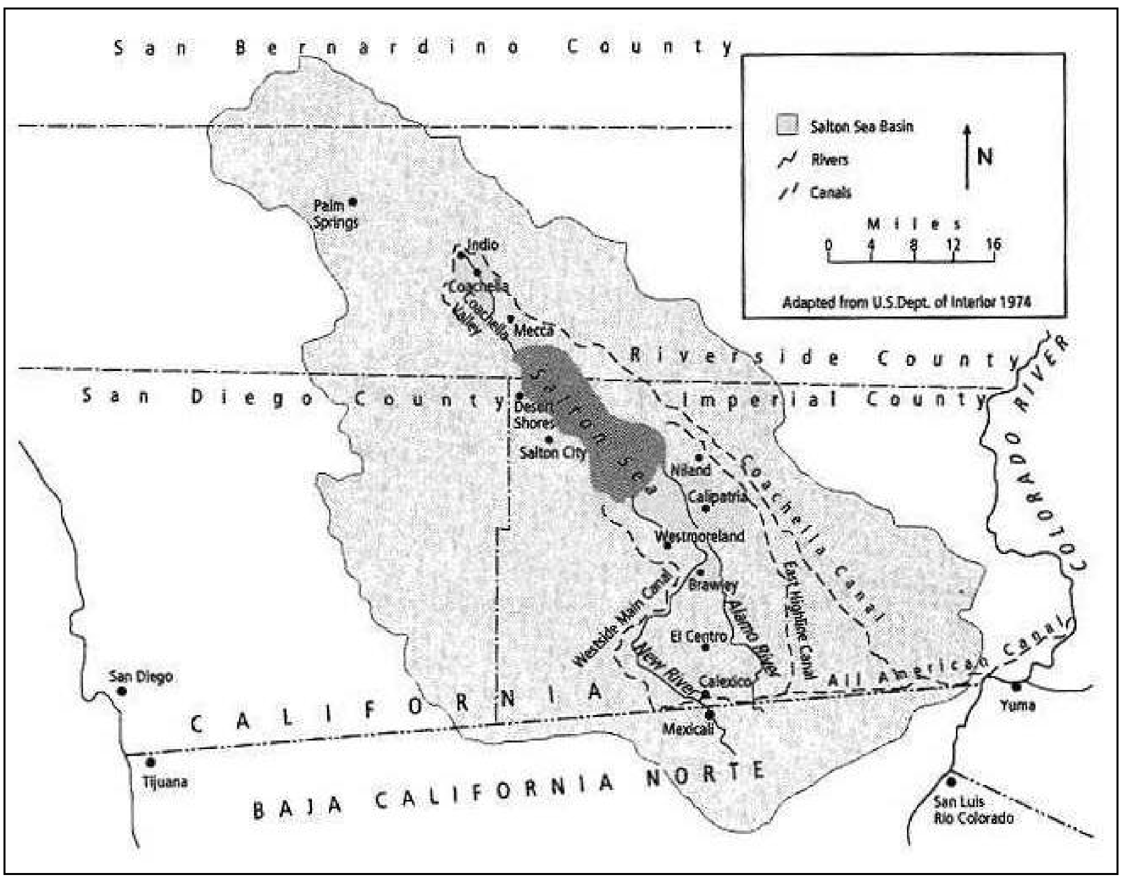
Table 2.4 New River Flows

Source	Flow Contribution (% of 438,400 AFY)
US Sources	
Treated Municipal and Industrial Wastewater	2%
Agricultural Runoff	62%
Stormwater and Urban Runoff	< 0.5%
Mexican Sources	
Partially treated and untreated Municipal and Industrial wastewater	8%
Agricultural Runoff	25%
Stormwater, Urban Runoff, Other	2.5%

2.2.2 SALTON SEA TRANSBOUNDARY WATERSHED

The New River watershed is actually a sub-watershed of the Salton Sea Transboundary Watershed. The Salton Sea Transboundary Watershed encompasses (about 8,360 square miles) of the Colorado River Basin Region and contains five (out of a total of six) of the Region's impaired surface waterbodies. Most of the watershed is in Imperial County, but it also receives drainage from Coachella Valley in Riverside County and the Mexicali Valley in Mexico (via the New River and to a lesser extent the Alamo River). The most striking feature in the watershed is the Salton trough, which contains the Salton Sea. Figure 2.1, below, shows the watershed, its characteristics, and its boundaries.

Figure 2.1 Salton Sea Transboundary Watershed (Source: Cohen et al. 1999)



For the purposes of water quality issues, the Salton Sea Transboundary Watershed can be divided into four main areas: the Coachella Valley, the Salton Sea, the Imperial Valley, and the Mexicali Valley. The most significant water quality problems within the U.S. portion of the watershed are associated with the Salton Sea and its major tributaries: the New and Alamo Rivers, and the Ag Drains; all in Imperial Valley. Table 2.5, below, shows the current Section 303(d) pollutants for the aforementioned surface waters.

Table 2.5 Imperial Valley Surface Waters 303(d) List

Waterbody	Pollutants of Concern
Imperial Valley Agricultural Drains	Sediment, Pesticides, Selenium
Alamo River	Sediment, Pesticides, Selenium
Salton Sea	Selenium, Salt, Nutrients
New River	Sediment, Pesticides, Bacteria, Nutrients, Volatile Organic Compounds (VOCs)

The Salton Sea is California's largest lake and has been famous for its sport fishery and recreational uses. It is about 35 miles long and 9 to 15 miles wide with approximately 380 square miles of water surface and 105 miles of shoreline. The surface of the Sea lies approximately 227 feet below MSL. One of the major functions of the Salton Sea is to serve as an agricultural wastewater sump for the Imperial and Coachella Valleys. In 1924 and 1928, the President of the United States executed Public Water Reserve Order Numbers 90 and 114, respectively, for withdrawal of 123,360 acres of public land lying at an elevation of 220 feet below MSL, in and surrounding the Salton Sea. These lands were designated as a repository to receive and store agricultural, surface, and subsurface drainage waters. The State of California designated the Sea for this same purpose in 1968. Currently, the Sea is 25% saltier than the ocean, with salinity increasing at approximately 1% per year. It can also be classified as a eutrophic lake. The Sea supports a National Wildlife Refuge and is a critical stop on the Pacific Flyway for migrating birds, including several state- and federally-listed endangered and threatened species. The Salton Sea National Wildlife Refuge was established in 1930 to preserve wintering habitat for waterfowl and other migratory birds. However, catastrophic die-offs of birds and fish since 1992 indicate the Sea is seriously impaired by a number of pollutants, and may be unable to support its designated beneficial uses in the future. The New River serves as a transportation medium for pollution en route to the Salton Sea and discharges about 434,400 AFY at the delta. The Alamo River is the Sea's largest tributary, contributing about 650,000 AFY or 50% of the inflows to the Salton Sea. The current total inflow into the Salton Sea is about 1.3-million acre-feet/year (AFY)

2.2.3 FORMATION OF THE PRESENT SALTON SEA AND NEW RIVER CHANNEL

On October 11, 1905, a temporary diversion for irrigation water for the Imperial Valley from the Colorado River failed during flood conditions, and the entire flow of the Colorado River was diverted to the Salton Basin. It was not until February 1907, 16 months later, that the breach in the dike was repaired, and the river returned to its old course to the Gulf of California. This breach created the current Salton Sea and channels of the New River (thus the name "new") and the Alamo River (Gruenberg 1998). Under normal circumstances, the Salton Sea would have again dried up like its predecessor Lake Cahuilla. However, its recent accidental creation coincided with the development of agriculture in the Coachella, Imperial, and Mexicali Valleys. Since then, the Sea and its two major tributaries have been sustained by agricultural return flows and domestic/municipal wastes.

2.2.4 HISTORY OF NEW RIVER POLLUTION

Following its most recent accidental creation, the early history of New River pollution is sketchy, but associated with population growth in Mexicali and the inception of irrigated agriculture in the Imperial and Mexicali Valleys (Gruenberg 1998). In 1920, the total population of Mexicali was only 6,200 people. In 1955, it was estimated that raw sewage from approximately 25,000 people was being discharged into the New River from Mexicali. A focal point of early complaints regarding New River pollution was odor. In the early fifties, the stench emanating from the river near the boundary, particularly at night, was oftentimes overpowering. Beginning around 1956, the flows of the New River at the boundary increased considerably due to development of agricultural drainage return flows from Mexicali Valley. This dilution water temporarily alleviated the odor problem somewhat, but in the sixties the problem became increasingly noticeable as sewage loading increased with the population of Mexicali. In 1975, the population jumped to over 100,000 people[3]. The present population of the Mexicali municipality is reported as 764,902 by Mexico (INEGI, 2001), but some believe it is close to 1 million. In 1978, the California State Department of Health Services (DHS) recommended that, due to the presence of raw sewage, the New River should be posted as a public health hazard. The first of 50 signs along the New River was posted in 1978. Downstream of the International Boundary, the New River has been dominated by agricultural return flows from Imperial Valley. Up until the late 1960s, the New River also conveyed raw sewage from Imperial County cities and communities near the river (e.g., Calexico, Brawley, and Westmorland). Three Imperial County dumps were located in the floodplain of the New River (and still are) and until rechannelization of the river were just as bad as similar dumps in Mexicali.

Figure 2.2 New River at International Boundary

Figure 2.3 New River Channel and floodplain west of El Centro

[3]Due to the recent industrial growth in Mexicali, industry is now believed to also be an increasingly significant source of New River pollution.

2.2.5 LAND USES IN IMPERIAL COUNTY

The Imperial County covers approximately 4,597 square miles (2,942,080 acres) (Imperial County, 1998). About 50% of County lands are undeveloped and under the jurisdiction and ownership of the federal government. Of the developed acreage, approximately 501,500 acres are zoned for agricultural purposes, most of which are in Imperial Valley. The developed areas (e.g., cities, communities, and support facilities) occupy less than 1% of the land within the county. The Salton Sea covers about 7% of the County's area. Table 2.6, below, shows the general land uses in Imperial County.

Table 2.6 Imperial County Land Use Distribution

Irrigated (Agriculture)	Acres	Data Source
Imperial Valley	479,327	IID, 1999a
Bard Valley	14,737	Imperial County, 1998
Palo Verde	7,428	Imperial County, 1998
Developed		
Incorporated	9,274	Imperial County, 1998
Unincorporated	8,754	Imperial County, 1998
Desert/Mountains		
Federal	1,459,926	Imperial County, 1998
State	37,760	Imperial County, 1998
Indian	10,910	Imperial County, 1998
Private	669,288	Imperial County, 1998
Other		
Salton Sea	242,049	USBR, 1997

Today, over 480,000 acres of irrigated land are in production in Imperial Valley. From 1964 through 1998, IID distributed between 2.6 and 3.2 million acre-feet of Colorado River water for irrigation purposes. The major crops in the Valley, based on the amount of land in production, are alfalfa, wheat, Sudan grass, and sugar beets, which account for most of the land under production. According to data from IID, about 448,238 acres were used for field crops, 95,030 for vegetables, and 21,605 for permanent crops in 1997. Imperial Valley has an agricultural based economy, and is ranked among the top 10 agricultural counties in California. Reportedly, for every $1,000 of total gross value produced in the agriculture sector, $209 of personal income is generated by agriculturally related jobs (Imperial County Agricultural Commissioner 1997). Imperial County generates almost $1 billion dollars in revenue annually; reportedly, one in every three jobs in the Valley is related to agriculture (IID 1998b)

2.2.6 WEATHER

The climate of the Imperial Valley is typical of a desert area and is characterized by hot, dry summers, occasional thunderstorms, and gusty high winds with sandstorms. It is one of the most arid areas in the United States, has an average annual rainfall of less than 3 inches, and temperatures in excess of 100ºF for more than 100 days per year. The average January temperature is 54ºF, and the average July temperature is 92ºF. Evapotranspiration rates for Imperial Valley can exceed 7 ft/yr, and in hot summer months can be one-third inch per day. The frost-free period is greater than 300 days per year for 9 of 10 years, and greater than 350 days per year for 3 of 10 years (Setmire et al. 1990).

2.3 BIOLOGICAL SETTING

The New River is a part of the Salton Sea Transboundary Watershed and is therefore an important functioning component of the Pacific Flyway, a major migratory route connecting Canada and the US to Mexico and Central America. The degradation of wetland habitat elsewhere along the Pacific Flyway has rendered the area vital habitat for migratory avian species (USFWS, 1997). Millions of birds representing hundreds of species, including several endangered species, use the watershed as habitat on a year round basis. However, the severe overall pollution of the river has significantly prevented the establishment of a healthy ecosystem in the New River, in particular within the first 10 to 20 river miles in the U.S. While the presence of pesticides, excessive nutrients, harmful pathogens, and lethal dissolved oxygen concentrations all combine to form an extremely hazardous environment for wildlife, it is the dissolved oxygen that is the overriding factor. The diversity and abundance of life in the New River ecosystem is directly related to the dissolved oxygen trends in the River (Setmire, 1985). By the time the river reaches the U.S., the New River is often dominated by raw sewage and untreated industrial wastes from the City of Mexicali. This causes dissolved oxygen of the river to be depleted (i.e., to be typically less than 1 mg/L) for up to 20 river miles downstream of the border. In the first 20 miles north of the border due to dissolved oxygen concentrations, often times less than 0.5 mg/L, fish diversity and populations are generally low. In this stretch no more than 3 species were collected and sometimes only a single individual for each species was collected (Setmire, 1985). As the River courses through the Imperial Valley, a number of processes work to replenish the River with oxygen and thus greatly improve the opportunity for life: organic waste is broken down by bacteria thus decreasing the organic load; the river flows over drop structures which serve to re-aerate the River through agitation; and agricultural return flows input water with a relatively high dissolved oxygen content thus diluting the oxygen deficiency. About 10 miles from its outlet to the Salton Sea, the dissolved oxygen returns to around 4 mg/L.

The New River riparian corridors and deltas are potential major wildlife movement corridors and are considered to constitute sensitive habitat. The dominant plant species found along these corridors is salt cedar, an introduced species that has suffocated the native vegetation. Other plant species include reeds, cattails and arrowheads (Montgomery Engineers, 1987).

Stream biota must withstand extremes in water quality arising from the wild fluctuations in dissolved oxygen as well as variation in temperature. Although these stresses result in severely decreased biological diversity in the New River, there is some biological activity due to the sheer number of birds flocking to the abundance of water in the middle of the desert. Birds are the most diverse wildlife group using the New River watershed as habitat with over 50 species represented. Depending on the dissolved oxygen conditions, the diversity and abundance of bird species increases accordingly as the New River flows towards the Salton Sea. The most common birds are the burrowing owl, a state- and federally-listed species of concern, the savannah sparrow, yellow-rumped warblers, and the red-winged blackbird. The New River watershed is also potential habitat for the state-fully-protected-threatened and federally-listed endangered Yuma clapper rail (USFWS, 1997) and state-fully-protected-threatened California Black rail. Other songbirds and shorebirds that inhabit the area include the western yellow-billed cuckoo, the great blue heron, the black-necked stilt, the American avocet, the cattle egret, the white-faced ibis, and the double-crested cormorant. Fish that inhabit the waterbodies in the New River watershed include mosquito fish, carp, yellow bullhead channel and flathead catfish, tilapia, longjaw mudsucker, largemouth bass, red shiner, sailfin molly, and others. The state- and federally-listed endangered pupfish also is found in the drains and the New River near the outlet to the Salton Sea (USFWS, 1997). Although the fish species inhabiting the New River are relatively well adapted to extreme conditions in water quality, they are still vulnerable to lethal dissolved oxygen concentrations in the upper reaches.

The predator/prey relationships in the New River resemble those of the Agricultural Drains and can be divided into overlapping terrestrial and aquatic food chains. Aquatic invertebrates such as snails, waterboatmen and insect larvae feed on plankton, detritus, and aquatic vegetation at the base of the aquatic food chain. Fish, such as the desert pupfish, tilapia and mosquito fish represent the next level of the food chain and feed on aquatic invertebrates and plankton. Crayfish and the Asiatic river clam feed on aquatic invertebrates but do not feed on plankton. Rails, coots, and ducks—such as the ruddy duck, the American coot and the nothern shoveler—are the most versatile predators feeding on an array of organisms including crayfish, clams, aquatic invertebrates, fish and aquatic vegetation. The larger birds such as the great blue heron and the great egret represent the top of the food chain. These birds feed on organisms that are higher in the food chain while smaller birds, such as the American avocet and the cattle egret, feed on aquatic invertebrates and other organisms lower in the food chain. Turtles, such as the spiny softshell turtle, are at the top of the food chain and prey on fish as well as aquatic invertebrates and Asiatic river clams. The terrestrial food chain involves songbirds, flying and terrestrial invertebrates, rodents, and plant materials (USFWS 1997 and IID 1994).

2.4 SUMMARY OF EXISTING CONDITIONS

The concentrations of fecal coliforms and E. coli organisms in the New River indicate polluted conditions that threaten public health, particularly near the International Boundary. The main sources of these pollutants are discharges of undisinfected wastes from wastewater treatment plants in the Imperial Valley and wastes from the Mexicali area. The presence of harmful and infectious pathogens is highly likely because of the presence of extremely high concentrations of fecal coliforms and E. coli bacteria in the New River.

2.4.1 BACTERIA IN THE NEW RIVER AT THE INTERNATIONAL BOUNDARY IN VIOLATION OF MINUTE NO. 264 STANDARDS

The Mexicali metropolitan area is serviced by two wastewater treatment lagoon systems with a total combined rated design capacity of about 20-25 mgd. The systems are organically and hydraulically overloaded because municipal sewage flows in the Mexicali area on the order of 35 to 40 mgd. Undisinfected effluent from the lagoons is discharged into New River tributaries. Because of the lack of treatment capacity and an inadequate, dilapidated collection system, Mexicali is currently directly and indirectly discharging anywhere from 5 to 20 mgd of untreated municipal wastewater into the New River constituting a violation of the narrative standards of Minute No. 264. Additionally, there are numerous point sources and non-point sources discharging untreated wastes into the river and its tributaries[4]. These discharges of untreated wastes have been reported by both Sections of the International Boundary and Water Commission (IBWC) and documented by Regional Board and IBWC personnel during binational monthly inspections/observations of the New River watershed in Mexicali. The on-going bypasses of raw sewage and discharges of improperly treated undisinfected wastes into the New River result in fecal coliforms concentrations in the New River at the International Boundary in the range of 30,000 to greater than 16,000,000 MPN/100 ml. Further, recent water quality results for the New River at the International Boundary show E. coli bacteria at concentrations exceeding 100,000 MPN/100 ml. These untreated discharges, improperly treated discharges, and bypasses are in violation of Minute No. 264. Table A.1, in Appendix A, shows the fecal coliforms results for the New River at the International Boundary, which were obtained from 1975 through 1999 as part of the Regional Board monitoring program for the International Boundary.

2.4.2 BACTERIA IN THE NEW RIVER, DOWNSTREAM OF THE INTERNATIONAL BOUNDARY IN VIOLATION OF WATER QUALITY OBJECTIVES

As the New River flows northward through Imperial County to the Salton Sea, it receives additional bacteria from point and non-point pollution sources. Namely, the New River receives treated but undisinfected wastewater from the Date Garden Mobile Home Park Wastewater Treatment Plant (WWTP), McCabe Union School District WWTP, Seeley County Water District WWTP, City of Brawley WWTP, and City of Westmorland WWTP. Data from the California Department of Health Services show that secondarily treated undisinfected wastewater, such as in the case of the aforementioned WWTPs, may still contain significant number of pathogenic organisms. This is illustrated in Table 2.7, below.

Table 2.7 Bacteria and Viruses in Secondary Domestic Effluent[a]

Indicator Parameter	Minimum (MPN/100 ml)	Maximum (MPN/100 ml)
Fecal Coliforms	11,000	1,590,000
Fecal Streptococci	2,000	146,000
Virus	0.5	1,100

a. Table adapted from DHS, 1987

[4] A more detailed analysis of the known point and nonpoint sources of pollution within the Mexicali metropolitan area is presented in the Source Analysis section of the TMDL

These undisinfected and improperly disinfected discharges of wastes, coupled with the overwhelming bacterial load from Mexico cause the entire length of the New River downstream of the International Boundary to be impaired by fecal coliforms and E. coli bacteria. Tables B.1 and B.2 show recent bacteriological results for the New River and major drains discharging into the river. In April 2000, fecal coliforms and E. coli concentrations in the New River at its delta with the Salton Sea have both been measured as high as 40,000 MPN/100 ml. Figures B.1 and B.2, in Appendix B, are graphs of recent fecal coliforms and E. coli concentrations measured in the New River between the International Border and the Salton Sea. These concentrations violate the Basin Plan WQOs and represent a health hazard.

2.4.3 FECAL COLIFORMS IN THE NEW RIVER AS INDICATORS OF PUBLIC HEALTH HAZARDS

Untreated and improperly treated domestic wastewater contains pathogens (e.g., bacteria and viruses) at concentrations that pose a significant risk to public health. The presence and concentration of pathogens in municipal raw sewage depends on many variables such as available dilution, quantity and quality of industrial waste, vaccination programs, and community disease patterns (DHS, 1987). Table 2.8, below, shows typical microorganism concentrations in raw sewage.

Table 2.8 Bacteria and Virus Concentrations in Municipal Raw Sewage[a]

Indicator Organisms	Typical Concentrations (MPN/100 ml)
Total Coliform	10,000,000
Fecal Coliforms	3,000,000
Fecal Streptococci	500,000
Virus	500
Salmonella	100 - 10,000
Shigella	1 – 500
Helminths	1 – 100
Protozoa	10 – 200

a. Table adapted from DHS (DHS, 1987)

Persons can be exposed to pathogens through direct ingestion of contaminated water, ingestion of food species (e.g., fish) infected with pathogens absorbed from contaminated waters, and invasion resulting from skin contact with contaminated water. Diseases, which can be spread by contact with contaminated surface water, include salmonellosis (including typhoid and paratyphoid fevers), cholera, gastroenteritis from enteropathogenic E. coli, and shigellosis to name a few (USEPA 1986). Table C.1 in Appendix C contains a listing of infectious agents potentially present in raw sewage and the diseases they can cause[5] (DHS, 1987). In 1978, the Imperial County Health Department issued a warning of the possibility of epidemics of typhoid, salmonella, or dysentery for as long as the New River remained contaminated. The same year, mosquitoes in the New River area were checked and found to harbor an encephalitis virus considered to be infectious to humans (Gruenberg, 1998). Table 2.9, below, presents the ratios of pathogens and indicator organisms in municipal wastewater estimated by DHS (DHS, 1987):

Table 2.9 Pathogens Indicator Ratios[a]

Pathogen	Fecal Coliforms	Fecal Streptococci
Virus	$1{:}6\times10^3$	$1{:}10^3$
Salmonella	$1{:}3\times10^2 – 3\times10^6$	$1{:}5\times10^1 – 5\times10^3$
Shigella	$1{:}6\times10^3 – 3\times10^6$	$1{:}10^3 – 5\times10^5$
Helminth	$1{:}3\times10^4 – 3\times10^6$	$1{:}5\times10^3 – 5\times10^5$
Protozoa cysts	$1{:}1.5\times10^4 – 3\times10^5$	$1{:}2.5\times10^3 – 5\times10^4$

a. Table adapted from DHS, 1987

Since 1978, the New River has been posted to warn the public to stay away from the contaminated water and publicity about its water quality has undoubtedly prevented disease outbreaks and deterred people from coming into contact with river water. In spite of that, it is not unusual to observe people fishing in the New River downstream of the border. Further, people routinely use the river to gain access into the United States, and are immersed in and may incidentally ingest the polluted water. According to the U.S. Border Patrol, on any given night up to 120 people come across into the U.S. via the New River. The fecal coliforms and E. coli densities presented above indicate the presence of pathogenic organisms at densities/concentrations that pose a significant public health hazard. Another concern is the foam in the New River at the International Boundary. A foam sample was collected and tested by Regional Board staff in 1980 and found to contain fecal coliforms of up to 700,000 MPN/100 ml. Wind can transport the foam around the immediate vicinity of the New River. This also poses a public hazard and was noted in 1996 by the U.S. Department of Health and Human Services (USDHHS, 1996).

[5] The listing is not intended to be all-inclusive. As recommended by DHS, a more comprehensive account of pathogenic agents and their waterborne diseases are documented in medical literature and works such as Feachem et al., 1980 and 1983.

Figure 2.4 People in New River downstream of the Border

Figure 2.5 Foam in New River near the Border

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3. NUMERIC TARGET

The designated beneficial uses for the New River are freshwater replenishment (FRSH); water contact recreation (REC I); non-contact water recreation (REC II), warm freshwater habitat (WARM); wildlife habitat (WILD); preservation of rare, threatened or endangered species (RARE), and industrial service supply (IND). The REC I beneficial use is considered to require the most stringent bacteria water quality objective and involves water contact recreational activities such as swimming, wading, whitewater boating, and fishing. Based on epidemiological studies, the USEPA has established bacteria water quality objectives protective of human health with regards to direct and indirect contact with sewage-contaminated water (USEPA Jan 1986; USEPA May 1986; USEPA Sep 1988; USEPA May 1998). Based on the extensive nature of the studies and the source of these data, these objectives are considered to be appropriate for REC I type activities and are included in the Basin Plan. For the purposes of this TMDL, fecal coliforms, E. coli, and enterococci bacteria are to be used for the Numeric Target as the indicator organisms. It is impractical to monitor water quality for specific pathogens because each pathogen requires a specific test, and the pathogenic tests are not readily available in the region. Total coliform bacteria are found in the feces of man and animal, and in soil. Therefore, total coliforms are not considered to be useful pathogenic indicators. Fecal coliform bacteria are typically associated with the presence of fecal wastes from humans and other warm-blooded animals, which can pose a significant threat to public health. They are also more representative of the sanitary quality of surface waters than total coliform organisms (DHS, 1987). The same is true for E. coli bacteria. The following are the target concentrations for the TMDL, as shown in the Basin Plan[6].

Table 3.1 Target Bacteria Concentrations for New River

Indicator Parameter	30-Day Geometric Mean[a]	Maximum
Fecal Coliforms	200 MPN[b]/100ml	c
E. coli	126 MPN/100 ml	400 MPN/100 ml
Enterococci	33 MPN/100 ml	100 MPN/100 ml

a. Based on a minimum of no less than 5 samples equally spaced over a 30-day period.
b. Most probable number.
c. No more than 10% of total samples during any 30-day period shall exceed 400 MPN/100 ml.

These concentrations are considered to contain an adequate margin of safety and are proposed as the cleanup goal for the New River. The progress of attaining this goal will be gauged by the punctual implementation of management and mitigative actions in accordance with this TMDL.

[6] Because commercial testing for fecal enterococci is not available within the region, the Regional Board waste discharge requirements generally specify that fecal coliforms and E. coli bacteria be used as water quality indicators of the presence of pathogens.

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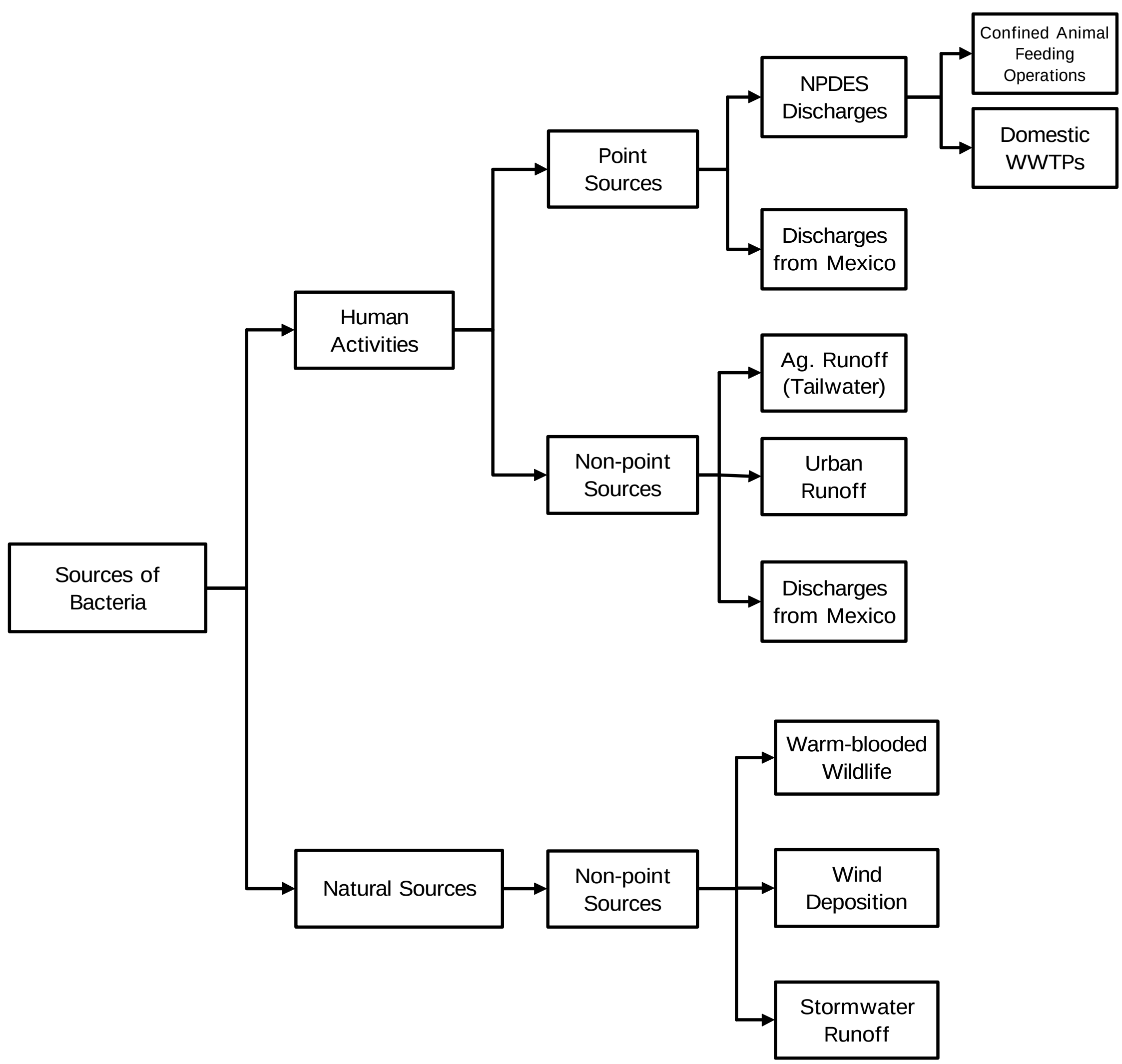
4. SOURCE ANALYSIS OF BACTERIA IN THE NEW RIVER

This section identifies and evaluates the various potential and actual pathogen sources in the New River Watershed. There are two main categories of sources: manmade sources and natural sources. The manmade sources in the U.S. consist of wastewater treatment plants (WWTPs) discharging wastewater under the National Pollutant Discharge Elimination System (NPDES), agricultural return flows, potential discharges from confined animal feeding operations (CAFOs), and urban runoff. The New River waters at the International Boundary consist of wastewaters from point and non-point sources of pollution in the Mexicali Valley, Mexico. The natural sources are warm-blooded wildlife, stormwater runoff, and wind deposition. These various sources are discussed in detail in the following sections. The two sources that contribute the greatest pathogenic pollutant load to the New River are the NPDES facilities and the wastewater originating in Mexico. Figure 4.1, below, illustrates the various sources of bacteria.

Figure 4.1 Actual Sources and Potential Sources of Bacteria in the New River



Estimating the pollutant source contributions of bacteria is signifigantly different than performing the same analysis for other pollutants such as sediment, pesticides, or nutrients. First, the measurement of bacteria loadings for the purpose of this TMDL is given as a most probable density-based measure (i.e., Most Probable Number per 100 ml), which can be tought of as a concentration[7], as opposed to a mass based measure (e.g., pounds/per day). This means that the source contributions do not reveal the total amount of bacteria a certain discharger is "producing", they only reveal the most probable concentration at any given point in time[8]. The measurement of bacteria contribution is additionally misleading because the source is typically contributing not only bacteria to the stream, but it also contributing organic material, which could lead to the growth of more bacteria. The total mass of bacteria associated with the original discharge should actually include bacteria growth arising from discharged organic material.

The phenomena of regrowth or multiplication of indicator organisms in sewage effluents following dilution with fresh water, storage, or disinfection and discharge to water body has been studied since 1930's. One study, for example, found that the regrowth of coliform organisms in secondary effluent that had received a chlorine dosage of 1 mg/L was substantial. There was no substantial regrowth of bacteria in secondary effluent that received higher chlorine doses (1-5 mg/L), which was ascribed to a nutrient deficient environment and the presence of chlorine residual (Greenberg, 1971). Other variables like salinity and temperature affect regrowth. Further, regrowth is not constant even for indicators of the same species under the same environmental conditions. For example, a mixture of 1 % undisinfected primary effluent and Sacramento River water showed a 40-fold increase in total coliform bacteria, but only a 6-fold increase in fecal coliform bacateria (DHS, 1968). Another study documented the results of fecal colifom regrowth in sewage effluent and downstream receiving waters (Shuval, 1973). The study showed that trickling filter effluent contained $5x10^6$ MPN total coliforms/100 ml, which were reduced to 120 MPN/100 ml by chlorination, which increased to 800 MPN/100 ml after 3 days of storage.

Another complicating element is the timing of the decay and growth of bacteria in the river system. After waste is discharged into the receiving water, there is a time lag before the bacteria begin utilizing the organic matter for respiration. At this point, the mass of organic matter begins decreasing alongside a complimentary exponential increase in bacteria. After a period of time, the bacteria reach their peak growth attributable to the original discharge (which may have occurred several miles upstream). Finally, the last of the organic materials are consumed, and the bacteria eventually die off. Of course, this example considers only one point of discharge, in which case the source load contribution could be estimated as the concentration of bacteria at the critical point of peak growth.

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[7] For the purpose of this document, the terms "density" and "concentration" are used interchangeably in to describe the most probable bacterial densities, although it is recognized that the former is the proper term.

[8] It is possible, however, to determine the total numbers of indicator bacteria discharged into the river (or a system) based on the total volume of wastewater discharged by each source. But because the bacterial water quality objectives are expressed in terms of concentration, the determination has very little regulatory significance.

The 'real life' estimation of this concentration is extremely complex considering the matrix of dischargers, bacteria concentrations and organic concentrations operating in the New River system. For example, a wastewater treatment plant discharging into the New River at a point downstream of the international border adds organic matter to a bacteria population that is perhaps dying off. Now, if a measurement were taken downstream of this plant, the concentration of bacteria would be higher than it would have been had there not been this presence of bacteria 'leftovers' from Mexico. Measuring bacteria concentrations upstream and downstream of a discharger without considering the functioning of the river system as a whole may attribute contributions to the wrong source. For this reason, a qualitative description of the river system helps to quantify the various source contributions for the purpose of the Source Analysis Section of this document. Utilizing the phased approach described previously, the Regional Board will conduct additional monitoring to better understand the entire system. To help determine the current bacterial loading of the New River, Regional Board staff has been sampling the the New River at 16 different locations, which cover from the International Boundary to the river's terminus with the Salton Sea. Also, major agricultural drains tributary to the New River have been monitored. The sampling stations are described in Table 4.1, below. The overall bacteriological results are contained in Appendix B. Figure 4.2, on page 27, shows the location of sampling stations.

Table 4.1 Sampling Locations for New River

Sampling Location	Description
NR-1	Calexico USGS monitoring station for the New River (International Boundary).
NR-2	New River monitoring station, located approximately 380 feet downstream of outfall from the City of Calexico WWTP.
NR-3	New River monitoring station, located approximately 1,300 feet downstream of the intersection of the New River and the All American Canal, downstream from the Calexico WWTP and upstream from the Calexico SWDS.
NR-4	New River monitoring station, located approximately 650 feet downstream of the intersection of the New River and Highway 98, which is about 1000 feet downstream from the Calexico SWDS.
NR-5	New River monitoring station, located immediately downstream of the intersection of the New River and the Ferrell/La Brucherie Road Bridge.
NR-6	New River monitoring station, located immediately upstream of the intersection of the New River and the Brockman Road Bridge.
NR-7	New River monitoring station, located immediately upstream of the intersection of the New River and Evan Hewes Road Bridge.

Sampling Location	Description
NR-8	New River monitoring station, located approximately 860 feet downstream of the aeration structure, which is about 500 feet downstream of the intersection of the New River and the Evan Hewes Road Bridge.
NR-9	New River monitoring station, located approximately 2,500 feet upstream of the Navy Air Station Wastewater Treatment Plant outfall (i.e., upstream of the Imperial SWDS), on the west bank of the New River.
NR-10	New River monitoring station, approximately 380 feet downstream of the intersection of the New River and Worthington Road Bridge (i.e., downstream of the Imperial SWDS), on the east bank of the New River.
NR-11	New River monitoring station, located immediately downstream of the intersection of the New River and Keystone Road Bridge.
NR-12	New River monitoring station, located immediately upstream of the intersection of the New River and Western Hovley Road Bridge (i.e., upstream of the Brawley SWDS).
NR-13	New River monitoring station, located at a point approximately 1,100 feet downstream from the Brawley SWDS.
NR-14	New River monitoring station, located immediately downstream of the intersection of the New River and Brandt Road Bridge.
NR-15	New River monitoring station, located immediately upstream of the intersection of the New River and Lack Road Bridge.
NR-16	North bank of New River just prior to discharge into Salton Sea, approximately 1 mile northwest of Lack Road Bridge.

4.1 POINT SOURCES IN THE U.S.

4.1.1 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) WWTPS

Regional Board records indicate that nine (9) facilities are currently discharging pollutants into the New River pursuant to the NPDES program. Of these facilities, eight (8) are WWTPs discharging domestic wastewater. The other NPDES facility is the Second Imperial Geothermal Company (SIGC), which is permitted to discharge 0.8 mgd of cooling tower blowdown water indirectly into the New River via the Beech Drain. This facility is, therefore, not considered to be a pathogen source requiring further evaluation. Three (3) of the WWTPs are discharging secondarily treated, disinfected domestic wastewater into the New River or its tributaries. The remaining five (5) WWTPs are discharging secondarily treated, undisinfected domestic wastewater into the New River directly or via tributaries.

Table 4.2, on the next page, lists the domestic NPDES facilities, their flows, and discharge location. (Facilities discharging secondarily treated and disinfected wastewater are shown in normal type. Facilities discharging secondarily treated, but undisinfected wastewater are shown in ***bold italic*** type.)

Table 4.2 Domestic NPDES WWTPs Discharging Wastewater into New River

Discharger	Approx. Avg. Flow (MGD)	Discharge Location	Discharger[9] Classification
U.S. Navy Facility, El Centro	0.11	New River, about 1000 feet upstream of Worthington Road Bridge	Minor
City of Calexico, 298 East Anza Road, Calexico	3.0	New River, about 1.5 miles downstream of the International Boundary	Major
Centinela State Prison, 2302 Brown Road, Imperial	0.6	Dixie Drain 1-C, which flows about 6 miles before it discharges its flows into the New River	Minor
City of Westmorland, 5295 Martin Road, Westmorland	***0.16***	***Trifolium Drain No. 6, at a point 3.6 miles upstream of where the Trifolium Drain discharges its flow into the New River***	***Minor***
Seeley County Water District, 1898 West Main Street, Seeley	***0.13***	***New River, about 1500 feet downstream of Evan Hewes Road Bridge***	***Minor***
City of Brawley, 400 Main Street, Brawley	***3.15***	***New River, at a point 47 miles north of the International Boundary.***	***Major***
Date Gardens Mobile Home Park, 1020 W. Evan Hewes Hwy., El Centro	***0.01***	***Rice 3 Drain, at a point 7 miles upstream of where the Rice 3 Drain discharges its flow into the New River***	***Minor***
McCabe Union School District, 701 West McCabe Rd., El Centro	***0.0015***	***Wildcat Drain, at a point 3 miles upstream of where the Wildcat Drain discharges its flow into the Rice 3 Drain. Following the junction of the Wildcat Drain with the Rice 3 Drain, the Rice 3 Drain flows for another 7 miles before it discharges its flows into the New River***	***Minor***

[9] Classification based on volume of flow discharged and USEPA Guidelines.

The City of Calexico began disinfecting its WWTP effluent in late 1998. Since then, monitoring data submitted by the City for its WWTP show that the City has generally been in compliance with disinfection limits. Since last year, the Centinela State Prison WWTP has been in noncompliance with the disinfection limits of its permit and had a sewage spill. Because of this, the Executive Officer issued two separate administrative civil liability complaints against the prison. Prior to this noncompliance, the discharge from the prison WWTP had been generally in compliance with the permit limits. Also, the Navy has had historic noncompliance problems with its permit limits, but it recently upgraded its WWTP to ensure compliance with its permit. Table 4.3, below, shows relatively recent bacteriological data submitted by the remaining five WWTPs which are not disinfecting.

Table 4.3 Bacteriological Data for NPDES WWTPs Discharging Undisinfected Effluent

Discharger, Map Reference Number	Total Coliform Organisms MPN/100 ml (Max/Min/GeoM)	Fecal Coliforms Organisms MPN/100 ml (Max/Min/GeoM)	<u>E. coli</u> MPN/100 ml (Max/Min/GeoM)
City of Westmorland WWTP	35,000 9,000 18,722[a]	5,000 1,700 3,752	NR[b]
Seeley County Water District WWTP	80,000 500 21,078	23,000 240 7,366[a]	23,000 240 1,867[a]
City of Brawley WWTP	≥1,600,000 30,000 77,460[a]	≥1,600,000 24,000 34,289[a]	80,000 2,300 24,303
Date Gardens Mobile Home Park WWTP	≥16,000 7,000 8,997[a]	≥16,000 800 2,436[a]	NR
McCabe Union School District WWTP	30,000 ≥16,000 25,114[c]	13,000 7,000 9,539[c]	NR

a. Data is based on the analytical results of four samples due to the inadequate quantification of one sample by the laboratory (reported as <2,000 MPN/100 ml for Seeley County Water District, as ≥16,000 MPN/100 ml for Date Gardens Mobile Home Park and City of Westmorland, and as ≥1,600,000 MPN/100 ml for the City of Brawley).
b. Not reported.
c. Data is based on the analytical results of three samples due to the loss of one sample and the inadequate quantification of another sample (≥16,000 MPN/100 ml).

The data presented in Table 4.3 and the data presented in Table 2.4 (p. 8) indicate that these WWTPs are significant sources of bacteria and, therefore, significant sources of pathogens. In short, these WWTPs are discharging bacteria in concentrations that violate and contribute to violations of the Basin Plan WQS.

4.1.2 CONFINED ANIMAL FEEDING OPERATIONS (CAFOS)

CAFOs are defined as "any place where cattle, calves, sheep, swine, horses, mules, goats, fowl, or other domestic animals are corralled, penned, tethered, or otherwise enclosed or held and where feeding is by means other than grazing" (California Code of Regulations Title 27). A review of Regional Board files on these facilities indicates that there are nine (9) known CAFOs within the New River watershed (United States). These CAFOs are governed by Board Order No. 01-800 (General National Pollutant Discharge Elimination System (NPDES) Permit and General Waste Discharge Requirements for Confined Animal Feeding Operations). The facilities are listed in Table 4.4, below, and their locations are illustrated in Figure 4.4 on the next page.

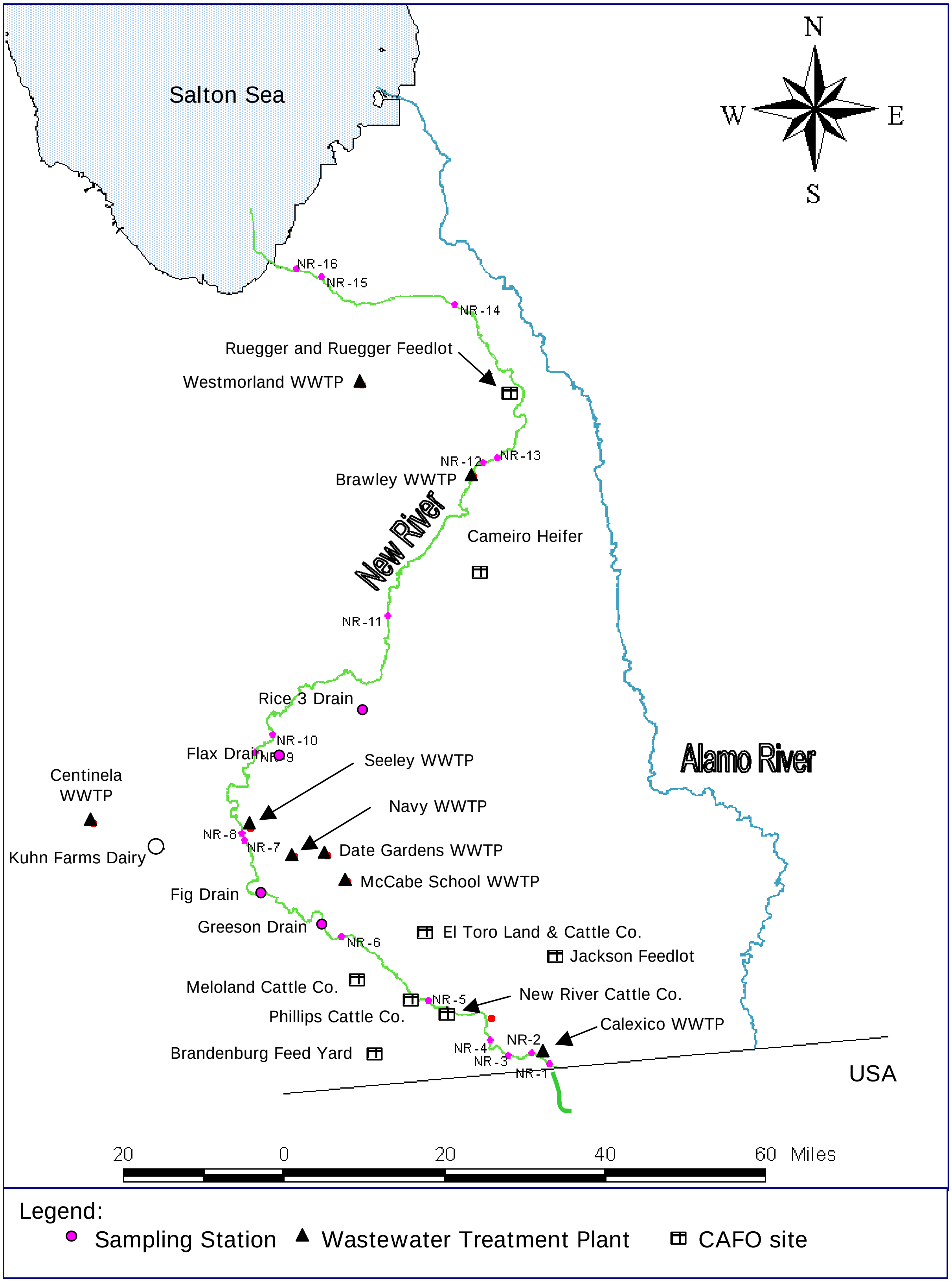
Table 4.4 Confined Animal Feeding Operations in the New River Watershed

Site, Address, and Map Reference Number	Maximum Number of Animals Confined	Distance to the New River or a tributary	Bacterial Threat to New River[10]
Brandenburg Feed Yard 903 West Highway 98, Calexico, 1	5,000	Adjacent to Greeson Drain	Moderate
New River Cattle 420 West Kubler Road, Calexico, 2	9,500	Adjacent to New River	High
Phillips Cattle Co. 910 Nichols Road, El Centro, 3	12,000	Adjacent to New River	High
Meloland Cattle Co. 907 Brockman Road, El Centro, 4	15,000	Adjacent to Wisteria Drain	Moderate
Jackson Feedlot 495 West Heber Road, El Centro, 5	11,000	1.5 miles	Low
El Toro Land and Cattle Co. 96 East Fawcett Road, Heber, 6	30,000	2 miles	Low
Kuhn Farms Dairy 1870 Jeffery Road, El Centro, 7	2,453	Adjacent to Dixie Drain #4	Moderate
Cameiro Heifer Ranch 195 West Corey Road, Brawley, 8	5,500	2 miles	Low
Ruegger and Ruegger Feedlot 604 Bannister Road, Westmorland, 9	3,000	Adjacent to Timothy Drain	Moderate

Figure 4.2, on the next page, shows the location of the WWTPs, CAFOs, and sampling stations.

[10] Threat estimates are based on site's size and proximity to surface water.

Figure 4.2: WWTPs, CAFOs, and Sampling Stations in New River wastershed



Whereas the significance of these specific facilities as pathogen sources to the New River is currently unknown, in general CAFOs are known pathogen sources to surface and groundwater (Kreis et al., 1972). Fecal coliform concentrations as high as 100,000,000 MPN/100 ml have been detected in CAFO wastewater (USEPA, 1973). Possible contamination routes include groundwater infiltration and conveyance, and transport by stormwater runoff. Considering the lack of precipitation in the Imperial Valley, infiltration and conveyance seem more likely[11]. Preliminary bacterial water quality data obtained by CRWQCB staff at 16 New River sampling stations within the U.S. show increases and decreases of bacterial concentrations between several stations. Generally, even though no statistical significance has been ascribed to the data from one station to another, the difference in concentrations between stations suggests potential regrowth and/or the presence of other sources of bacteria. The river segment between the Ferrell Road and Brockman Road bridges sampling station fits this description. Bacterial data collected by staff in 2000 from these two sampling locations, presented in Table 4.5, indicates fecal coliform and E. coli concentrations at the downstream station (NR-6) were two to three times greater than the upstream station (NR-5) for five out of six sampling events. Potential bacterial sources are three known agricultural drains discharging into the New River and the Phillips Cattle Company and the New River Cattle Company both located immediately adjacent to the river (Figure 4.5). Relative to other regions of the country, the potential of Imperial Valley CAFOs to significantly impact receiving waters is diminished by the arid climate, lack of rainfall, and very fine-grained soils. At this time, however, the data are inconclusive to make statistical inferences in between stations, but the overall trend is decreased concentrations at the river's outlet with the Salton Sea. Additional water quality monitoring activities are required to identify the source(s) and make statistical determinations.

Table 4.5 New River Bacterial Concentrations at Sampling Stations NR-5 and NR-6

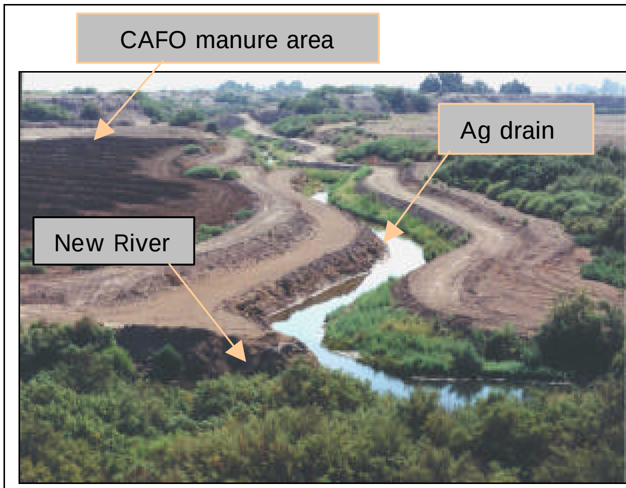
		Fecal (MPN/100 ml)		E. coli (MPN/100 ml)	
Drain	Month	Geometric Mean	Maximum	Geometric Mean	Maximum
Ferrell Road (NR-5)	Jan	65,885	130,000	NA*	NA
	Feb	64,151	110,000	36,342	60,000
	Mar	223,871	300,000	155,458	170,000
	Apr	176,239	230,000	50,397	80,000
	May	NA	NA	NA	NA
	Jun	687,534	1,300,000	447,642	1,300,000

[11] CAFO's that do not have young stock are of substantially less risk to microbial water quality compared to operations that have calves, and that a beneficial management practice of stacking manure for 3 to 6 weeks can dramatically reduce the pathogen load/Kg of manure.

		Fecal (MPN/100 ml)		E. coli (MPN/100 ml)	
Drain	Month	Geometric Mean	Maximum	Geometric Mean	Maximum
	July	435,330	500,000	242,724	500,000
Brockman Road (NR-6)	Jan	155,458	170,000	NA	NA
	Feb	320,753	500,000	95,901	140,000
	Mar	700,000	700,000	229,019	260,000
	Apr	355,689	500,000	94,354	300,000
	May	NA	NA	NA	NA
	Jun	269,390	500,000	169,410	220,000
	July	559,877	5,000,000	479,867	5,000,000

a. Not Analyzed.

Figure 4.3 Phillips Cattle Co. and New River Cattle Co.



Phillips Cattle Company

New River Cattle Company

4.2 NON-POINT SOURCES IN THE U.S.

4.2.1 AGRICULTURAL RUNOFF

The New River is sustained mainly by agricultural return flows from the Imperial Valley and the Mexicali Valley in Mexico. Most of the agricultural flows in the Imperial Valley reach the river via agricultural drains operated and maintained by the Imperial Irrigation District (IID). Flood irrigation is the typical irrigation method practiced in the Imperial Valley. Water that runs over the field to the drain without percolating into the soil is called tailwater and has the potential to transport bacteria to the drains.

Agricultural activities that are potential sources of bacteria in tailwater include livestock grazing and the application of dried animal manure to farmland as fertilizer. Also, during irrigation events, insects are driven from their earthly dwelling where they attract hungry birds whose feces contribute to bacterial loads as the tailwater runs over the field. Table No. 4.6, on the next page, shows the bacteria concentrations measured on samples collected by CRWQC staff from for the major drains in the year 2000.

Figure 4.4 Agricultural Tailwater

Table 4.6 Bacterial Concentrations in Major Drains During 2000

		Fecal Coliforms (MPN/100 ml)		E. coli (MPN/100 ml)	
Drain	Month	Geometric Mean	Maximum	Geometric Mean	Maximum
Greeson	Jan	ND[12]	ND	NA[13]	NA
	Feb	ND	ND	ND	ND
	Mar	55	80	33	70
	Apr	48	80	6	7
	May	NA	NA	NA	NA
	Jun	**256**	**900**	126	220
	July	**324**	**700**	**139**	220
Fig	Jan	ND	ND	NA	NA
	Feb	ND	ND	ND	ND
	Mar	**367**	**900**	50	110
	Apr	90	300	26	50
	May	NA	NA	NA	NA
	Jun	23	30	16	17
	July	12	80	12	80
Flax	Jan	ND	ND	NA	NA
	Feb	ND	ND	ND	ND

[12] ND = Not detected.

[13] NA = Not analyzed.

		Fecal Coliforms (MPN/100 ml)		E. coli (MPN/100 ml)	
Drain	Month	Geometric Mean	Maximum	Geometric Mean	Maximum
	Mar	3	4	ND	ND
	Apr	66	110	46	110
	May	NA	NA	NA	NA
	Jun	171	210	**162**	210
	July	3	20	< 2	< 2
Rice 3	Jan	**1776**	**140000**	NA	NA
	Feb	ND	ND	ND	ND
	Mar	3	4	3	4
	Apr	**256**	**500**	27	34
	May	NA	NA	NA	NA
	Jun	**13446**	**17000**	**12092**	**17000**
	July	**3175**	**4000**	**3175**	**4000**

Although data from these sampling events show evidence of measurable loading in some of the drains, it is difficult to determine the exact source of the loads without a more detailed sampling program for the drains. The McCabe Union School District WWTP and the Date Gardens Mobile Home Park WWTP are discharging undisinfected domestic wastewater indirectly and directly, respectively, into the Rice 3 Drain, a New River tributary. Analyses of effluent from these facilities indicate concentrations of bacteria that significantly exceed water quality objectives (WQOs) for bacteria. Therefore, the discharges from these facilities influenced the results for January, April, June, and July 2000 results for the Rice 3 Drain. The results also could be affected by other unidentified sources (and/or processes like regrowth). Addressing the uncertainty surrounding the quantification of agricultural sources at this point is not practicable because of the extreme levels of pollution in the river.

4.2.2 STORMWATER RUNOFF

Stormwater runoff, a product of precipitation events, has the capacity to cause large-scale erosion in areas prone to intense storm events and erosion. For the purposes of this TMDL, most of the stormwater runoff comes from farmland, roads, and the Valley communities draining into the New River. No data have been collected to characterize the actual bacterial/pathogenic contribution from stormwater runoff from these entities. However, with an annual average precipitation of about 2.5 inches, if anything, the Valley is known for its lack of rain. Analysis of actual 1994 through 1999 precipitation data for the Imperial Valley area drained by the New River shows that stormwater runoff was actually less than 0.8% of the flow in the River (CRWQCB, 2000). Most runoff either percolates into the ground, evaporates, or is discharged into WWTPs (see Section 4.2.4, below). Therefore, stormwater runoff in general is a relatively insignificant source of bacteria/pathogens, except stormwater runoff that may come in contact with animal manure applied to farmland as a fertilizer, which must be characterized through special monitoring.

4.2.3 URBAN RUNOFF

Urban runoff originates from human activities. Urban runoff within the context of this TMDL is non-stormwater runoff originating from urban sources. Examples of urban runoff are the wastewater from washing cars and runoff from landscape irrigation, which end up in drains tributary to the river or in the river itself. Currently, Westmorland, Calexico, and the unincorporated community of Seeley do not have urban runoff collection and conveyance systems. The Calexico Airport has an urban runoff collection and conveyance system discharging directly into the New River. Brawley has an urban runoff collection and conveyance system, of which 60% discharges to the New River and 40% discharges to the WWTP (Phone Conversation with WWTP Personnel, 2000). The El Centro Naval Air Station has an urban runoff collection and conveyance system discharging to the New River (Phone Conversation, 2000). These types of wastewaters are also known for carrying bacteria. However, considering the arid climate of the area and that less than 0.5% of the area drained by the river is urbanized, the fate of urban runoff parallels that of stormwater—that is, urban runoff is more likely to evaporate or infiltrate into the ground than to end up in the river. Thus, urban runoff is not considered to be a significant source of bacteria or pathogens, the focus of this TMDL.

4.2.4 NATURAL SOURCES (WIND DEPOSITION, WILDLIFE)

Natural sources of bacteria/pathogens include warm- and col-blooded wildlife and wind deposition. These sources can contribute pathogens directly into the New River and indirectly into the New River via agricultural drain water. Turtles, for example, are present in the New River. Also, local and migratory birds as well as other wildlife use farmland for sustenance, particularly farmland with grain crops. Currently, it is unknown to what degree these sources contribute bacteria to the New River. Considering the level of bacterial pollution throughout the entire stretch of the New River in the Imperial Valley, in particular the first 20 miles of the river, it would be extremely difficult to characterize the contribution from these sources unless the bacterial counts at the boundary and other key places (e.g., Brawley and Westmorland) are reduced significantly. In any event, although no data has been collected to characterize the actual direct bacterial contribution from wildlife, their contribution at this point is believed to be insignificant relative to the contribution by other known point sources in the US and from Mexico.

4.2.5 OTHER SOURCES

As mentioned in Section 4.1.2 of this document, CRWQCB monitoring data for the river indicates bacterial densities go up and down at various points in the River. The increases are readily noticeable downstream from the Calexico Landfill at the intersection of the New River and Highway 98 (sampling station NR-4); at the intersection of the New River and Brockman Road Bridge (NR-6), as discussed in Section 4.1.2; and immediately downstream of the intersection of the New River and Keystone Bridge (sampling station NR-11). Tables B.1 and B.2 in Appendix B illustrates the increases. Figure 4.7 and Table 4.7, below, shows the river by the landfill and the measured bacterial densities upstream of and at NR-4 during the year 2000, respectively.

Figure 4.5 New River Immediately Upstream of Highway 98

Table 4.7 Bacterial Concentrations Upstream and Downstream of Highway 98 Culvert

Location	Month	Fecal (MPN/100 ml)		E. coli (MPN/100 ml)	
		Geometric Mean	Maximum	Log Mean	Maximum
New River upstream of Landfill and Culvert (NR-3)	Jan	25,198	40,000	NA*	NA
	Feb	88,959	110,000	60,732	80,000
	Mar	85,086	110,000	67,533	110,000
	Apr	157,231	230,000	50,397	80,000
	May	NA	NA	NA	NA
	Jun**	242,610	340,000	200,764	340,000
	July	804,145	1,300,000	407,163	500,000
New River downstream of Landfill and Culvert (NR-4)	Jan	63,496	80,000	NA	NA
	Feb	95,973	170,000	48,203	70,000
	Mar	185,257	220,000	119,208	140,000
	Apr	162,626	230,000	44,480	110,000
	May	NA	NA	NA	NA
	Jun	228,305	500,000	159,346	170,000
	July	650,296	1,100,000	263,041	500,000

- NA = Not analyzed.

At this time, although the data are statistically inconclusive as to the actual causes for the increases at the above-mentioned stations, they suggest that (1) the nutrient/organic loading (e.g., loading from Mexicali) may be causing bacteria regrowth, and (2) other sources may also be contributing to violation of the WQOs. The table shows that the results at sampling station NR-4 are two times greater than the results upstream sampling station (NR-3) and potential sources of bacteria include the Imperial County Calexico Solid Waste Disposal Site (SWDS) and trash from Mexico. A significant amount of "bulky" trash gets “trapped” at a culvert upstream of sampling station NR-4, immediately east of the Calexico SWDS. County staff removes up to 200 cubic yards of the accumulated trash every six months to maintain the landfill area and culvert. The nutrients in the New River water column, the nutrients in the trash, and septic condition of the New River present a natural environment for bacteria to thrive at this location. As far as the increases at NR-11, there are no known point sources discharging in between the NR-10 and NR-11. There are, however, several agricultural drains discharging in this river segment. Also, within the Imperial Valley there are a significant number of generally isolated residences not connected to community sewers. There is potential that sewage from some of these residences may be entering the agricultural drainage system. Although most of these isolated residences are believe to utilize septic tanks for sewage disposal, septic tanks do not function very well in Imperial Valley’s clay soil, which could result in illicit means of disposal by some individuals. Special monitoring activities may be required to investigate these potential sources of pollution, but characterizing their impact now is impractical—not to mention extremely difficult due to the due to current high levels of pollution in the river.

4.3 KNOWN SOURCES IN THE MEXICALI VALLEY, MEXICO

New River pollution from the Mexicali Valley is caused by both point and nonpoint sources of pollution. Nonpoint sources of pollution in the Mexicali Valley primarily consist of agricultural return flows and urban runoff. The main point sources of bacterial pollution in the Mexicali Valley are the existing wastewater treatment lagoons and the sewage collection and conveyance system. Other point sources of pollution in Mexicali include industrial discharges and CAFOs.

For sewage service purposes, the Mexicali metropolitan area is divided into the Mexicali I and Mexicali II areas. Mexicali I includes most of the old, well established neighborhoods to the west, and the existing sewage collection and treatment system in the city, excluding the Gonzalez-Ortega lagoon system. In terms of wastewater treatment facilities (WWTF), Mexicali I refers to the existing Zaragoza lagoons. The Mexicali II service area includes the new residential and industrial development to the east and the Gonzalez-Ortega lagoons. However, in terms of WWTFs, Mexicali II refers to the proposed new 20-mgd WWTF. The City of Mexicali is undergoing unprecedented growth. Its population is expected to increase at a rate of 2.6% per year (INEGI, 2000). However, Mexicali lacks an adequate sewage collection and treatment system for current and projected flows. It is currently being served by two systems of stabilization lagoons, both of which lack disinfection facilities. The systems have a combined total rated design capacity of about 20-25 mgd, but sewage flows were calculated in 1997 to be in the order of 35 to 40 mgd (CH2M Hill 1997). A Mexicali II collection and treatment system with a rated capacity of 20-mgd has been designed and is under construction to accommodate the needs of the eastern area of Mexicali. Completion of the new treatment system is expected by late 2002, but like the current system of lagoons, the new system does not include disinfection facilities in its design plans. Figure 4.8, on page 35, shows the Mexicali I and II service areas, key sewage infrastructure, the New River and its main tributaries in Mexicali, and key known industrial facilities discharging into the watershed. Data collected by the Regional Board staff and the IBWC indicate that most of the bacterial load at the International Boundary is related to an inadequate sewage infrastructure (e.g., pumping plants and principal sewer lines) in Mexicali. The data also indicate that anywhere from 5 to 25 mgd of raw municipal sewage are being discharged into the New River on any given day. Table 4.8, below, lists known and potential sources of bacteria in the Mexicali Valley, Mexico. The list is based on Regional Board and IBWC reports on monthly observation tours of the New River watershed in Mexicali and of the main sewage infrastructure. The table is not all-inclusive[14], but it nevertheless provides an idea of the overall threat to New River water quality.

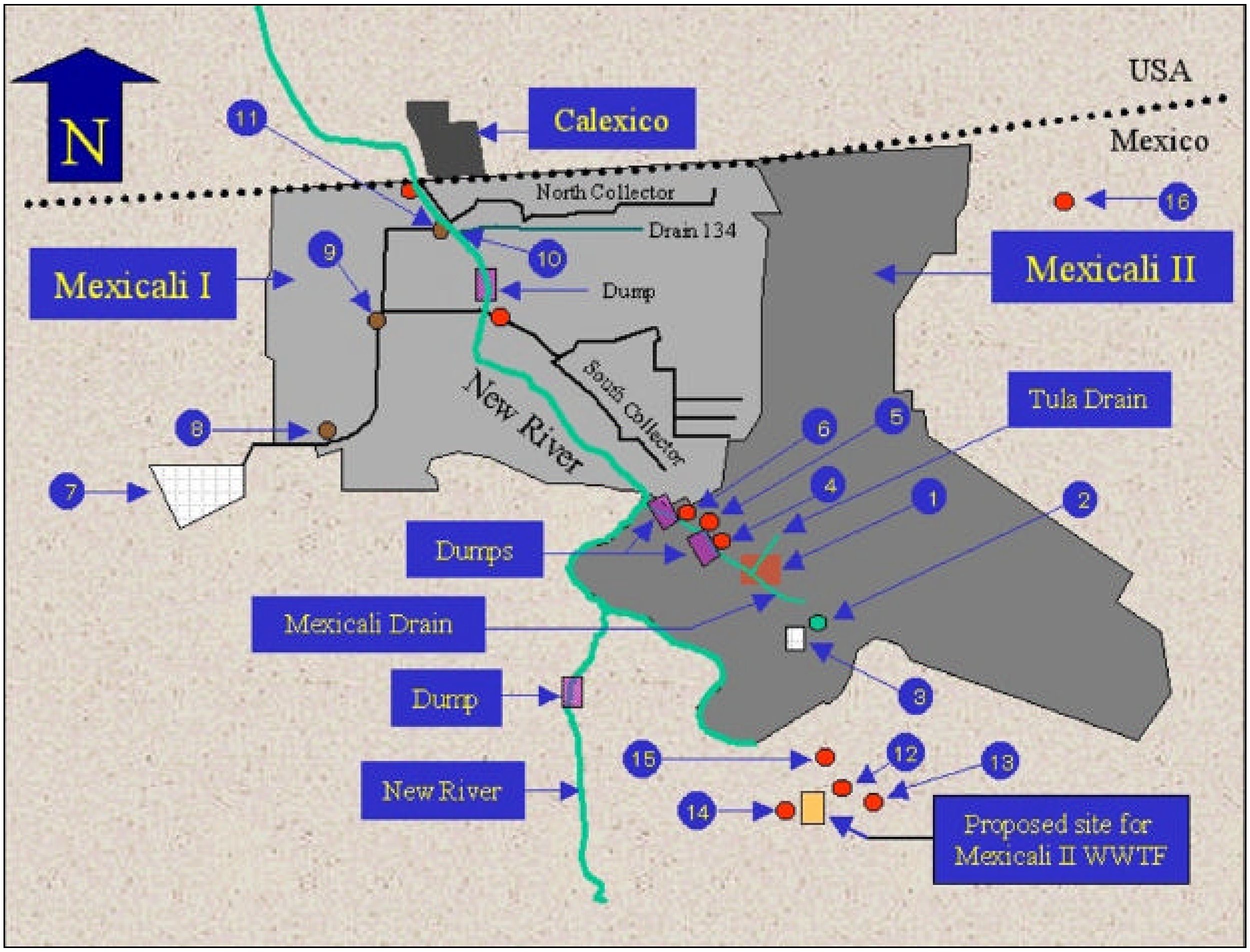
Table 4.8 Known Mexican Sources of Bacteria

Source	Approx. Potential Volume (mgd)	Type of Wastes			Potential FCO (MPN/100 ml)
		Municipal Raw Sewage	Undisinfected Wastewater	Industrial Wastes	
Drain 134	5.0	X		X	3.0×10^6 (a)
Pumping Plant No. 1	15.0	X			9.2×10^6 (b)
Pumping Plant No. 2	5.0-7.0	X			9.2×10^6 (b)
Pumping Plant No. 3	5.0	X			9.2×10^6 (b)
Pumping Plant No. 5	0.1-0.9	x			9.2×10^6 (b)
Mexicali II Collector	5.0	X			1.2×10^7 (b)
Nutrimex Collector	3.0	X			7.5×10^6 (b)
Gonzalez-Ortega Pumping Plant	3.0	X			1.7×10^6 (b)
Left Bank Collector	0.5-1.0	X			3.0×10^6 (a)
Right Bank Collector	0.5-1.0	X			3.0×10^6 (a)
Right Bank Pumping Plant	1.0	X			3.0×10^6 (a)
Gonzalez-Ortega Lagoons	3.0		X		8.0×10^6 (b)
Zaragoza Lagoons	25-35		X		2.0×10^6 (b)
Tula West Drain	6.5	X		X	3.0×10^6 (a)

[14] Observations tours conducted by IBWC and Regional Board staff indicate that there are a significant number of outhouses and CAFOs discharging into the New River watershed in Mexicali.

(a) based on data published by DHS (DHS, 1987)
(b) Based on actual data collected by CH2M Hill (CH2M Hill 1997)

Figure 4.6 Main Sewage Infrastructure in the Mexicali Metropolitan Area



1. Industrial Area: Hidrogenadora Nacional (Conasupo), Quimica Organica, Quipac, Vitromex	7. Zaragoza Lagoons (Mexicali I WWTP)	13. Steel recycling plant
2. Gonzalez-Ortega Lift Station	8. Pumping Plant No. 3	14. Slaughterhouse discharge
3. Gonzalez-Ortega Lagoons	9. Pumping Plant No. 1	15. Maseca
4. Kenmex	10. Drain 134	16. Fabrica de Papel San Francisco
5. Colector Mexicali II bypass	11. Pumping Plant No. 2 and Right Bank Lift Station	
6. Colector Nutrimex bypass	12. Hog farm discharge	

Both of the existing wastewater treatment facilities (WWTFs) do not provide effluent disinfection and are, therefore, a major source of bacterial pollution as shown by the table. Also, the proposed Mexicali II WWTF lacks disinfection facilities and is, therefore, considered to be a major future source of bacteria too. Regional Board bacteria data for the New River at the International Boundary are included in Table A.1, Appendix A. The data show that while fecal bacteria concentrations have overall declined, the concentrations, which fluctuate from the mid 50,000s to greater than 16,000,000 MPN/100 ml, continue to pose a significant threat to public health and violate the WQOs for bacteria. The existing data, and in particular the more recent data collected for the entire stretch of the New River in the U.S., suggest that overall bacterial densities in the river are directly related to the amount of raw sewage flowing from the Mexicali area. For example, from January to May 2000, it is estimated that on any given day Mexicali was discharging anywhere from 5 to 20 mgd of raw sewage into the river because major collectors were collapsed. When some of these raw sewage discharges were rectified in May 2000, the bacterial concentrations throughout the river decreased significantly at the river's outlet to the Salton Sea, although they are still very high within the first 20 or so miles of the river and seemingly spike due to sources in the U.S. (see Appendix B, which contains sampling data for river).

4.4 RECOMMENDED ACTIVITIES FOR REFINEMENT OF SOURCE ANALYSIS

Given the limited available data concerning natural sources of coliform contamination and limited data on anthropogenic non-point sources of pollution in the watershed, additional sampling for the Imperial Valley Ag drains is necessary to better quantify their impacts on the New River. Of particular concern is a more detailed characterization in the areas of the Brockman Road and Keystone Road bridges. However, until the known significant sources of pollution are controlled, it may not be feasible to characterize acute impacts from point (e.g., CAFOs) and nonpoint sources (agricultural drainage). A continuous monitoring program at the International Boundary and at the various sampling stations along the New River in Imperial Valley is necessary to better define the magnitude and characteristics of the problem. These efforts are part of the Implementation Plan for this TMDL and are expected to result in recommendations for changes to the TMDL and/or implementation measures proposed in this report. The Implementation Plan outlines a task schedule for the completion of these efforts.

5. WASTELOAD AND LOAD ALLOCATIONS

The maximum allowable pollutant load is defined in the USEPA TMDL Guidelines (USEPA 1991) as the total load of a particular pollutant, in this case bacteria, that can be present in a water body and still ensure the designated beneficial uses are attained and maintained. Also, factors to account for uncertainty and lack of knowledge (margin of safety), and future growth are to be established in this process. USEPA guidelines recommend that the maximum allowable pollutant load is reduced by these two factors and the remaining allowable pollutant load is allocated at reasonable and fair quantities to pollutant sources: point sources (Wasteload Allocation, WLA) and nonpoint sources (Load Allocation, LA).

5.1 WASTELOAD AND LOAD ALLOCATIONS

Pathogens are not readily controlled on a mass-basis. Also, it is the number of organisms in a given volume of water (i.e., their density), and not their mass, that is significant with respect to public health and the protection of beneficial uses. Therefore, density-based WLAs for point sources and LAs for non-point sources are needed and established herein to achieve the TMDL[15]. Consequently, this TMDL establishes the existing Basin Plan density-based bacterial objectives as the WLAs for point sources and LAs for non-point sources, expressed as fecal coliforms, E. coli, and enterococci organisms, to ensure attainment and consistent compliance with the beneficial uses of the River by June 2004. Table 5.1, below, shows the allocations.

Table 5.1 Wasteload and Load Allocations

Indicator Parameter	WLAs and LAs	
	30-Day Log Mean[a]	Maximum
Fecal Coliforms	200 MPN[b]/100ml	c
E. coli	126 MPN/100 ml	400 MPN/100 ml
Enterococci	33 MPN/100 ml	100 MPN/100 ml

a. Based on a minimum of no less than 5 samples equally spaced over a 30-day period.

b. Most probable number.

c. No more than 10% of total samples during any 30-day period shall exceed 400 MPN/100 ml.

[15] The densities of individual bacteria sources are not additive. Therefore, density-based WLAs and LAs do not add up to equal the TMDL. To achieve a density-based TMDL, it is simply necessary to assure that each WLA and LA itself meets the density-based TMDL (SDRWQCB 1998).

5.2 MARGIN OF SAFETY

The TMDL process involves the establishment of a margin of safety to account for data uncertainty, growth, critical conditions, and lack of knowledge. The current bacteriological water quality objectives are based on epidemiological studies (USEPA 1986 Ambient Water Quality Criteria for Bacteria) based on risk analyses for the REC I beneficial use. Taking credit for decay and dilution in the establishment of this TMDL to claim a margin of safety is not prudent because it does not necessarily extrapolate to actual protection of public health (i.e., the fate and transport of actual pathogenic organisms may be significantly different than those of the TMDL indicator organisms). This notwithstanding, considering the levels of pollution and lack of knowledge, the establishment of an “adequate” margin of safety now would be at best highly arbitrary and speculative. Therefore, such approach is not recommended for this TMDL. Instead, the efforts are focused to attain the TMDL and, as new data and the TMDL attained, it may be appropriate to revise this TMDL and include a reasoned margin of safety. The effects of population growth, CAFO growth, and potential decreased in water in the watershed are discussed below.

5.3 FUTURE GROWTH

The three most likely events that could affect pathogen densities in the New River are: (1) population growth; (2) water transfer proposals between IID and various parties, including San Diego County Water Authority; and (3) growth in the CAFO sector. The following paragraphs discuss these potential impacts.

5.3.1 POPULATION GROWTH IN IMPERIAL VALLEY

According to data from the Valley of Imperial Development Alliance, the annual population growth for the U.S. portion of the New River watershed is projected at 2.5% for the next 20 years. One of the impacts from this projected growth would be to increase the volume of domestic wastewater discharged into the New River from the current 8.7 to 13.8 mgd. However, as this TMDL is density-based, the effluent from point sources and discharges from non-point sources, including the New River at the International Boundary, will be required to meet the bacteriological water quality objectives. Additionally, in accordance with NPDES permits, as WWTP reach 80 percent of design capacity, dischargers will continue to be required to take necessary actions to ensure consistent compliance with their NPDES permit.

5.3.2 POPULATION GROWTH IN THE MEXICALI AREA

In the Mexican portion of the New River watershed, Mexicali is undergoing unprecedented growth. Its population, according to the most recent census, is 763,902 (INEGI, 2000). According to the census, the population in the municipality is expected to increase at an annual rate of 2.6% (INEGI, 2000). Based on this projection, the population for the area would be about 1,278,064 within 20 years, which in turn would increase the domestic and industrial wastewater flows (currently estimated at 30-40 mgd) to approximately 59-67 mgd. However, as stated before, Mexicali lacks an adequate sewage collection and treatment system for current and projected flows. A Mexicali II collection and treatment system with a rated capacity of 20-mgd has been designed and is under construction to accommodate the needs of the eastern area of Mexicali. Completion of the new treatment system is expected by late 2002, but like the current system of lagoons, the new system does not include disinfection facilities. Without disinfection facilities and regulatory controls on discharges of wastes, this projected growth would result in continued violation of Minute No. 264, and chronic and significant violation of this proposed TMDL, even if pollution control efforts are successful in the U.S. If wastewater is disinfected, Mexico may decide to utilize treated wastewater. Mexico may start reusing the wastewater as soon as it is disinfected. However, with or without disinfection (i.e., with or without this proposed TMDL), as water demand increases in the Mexicali area because of population growth, and the wastewater quality is improved by on-going and already approved and funded sewage infrastructure projects that are to be completed within the next 2 to 5 years, Mexico may decide to reuse as much as 50 million gallons per day of the wastewater it is currently discharging into the New River. Such a diversion of wastewater would decrease river flows at the International Boundary by as much as 50 mgd and may result in further degraded water quality conditions at International Boundary if Mexico decides to continue sending the rest of its untreated and partially treated wastes.

5.3.3 GROWTH IN THE CAFO SECTOR

As the metropolitan areas of San Diego, Orange, and Riverside Counties continue to expand, there is the possibility that existing CAFO facilities and dairies in those counties may relocate to Imperial County. Also, dairies from the Central Valley may relocate into Imperial Valley. This would result in growth in the CAFO sector for Imperial County. These facilities, however, will be controlled through the current General NPDES permit for CAFOs, which under most circumstances prohibit discharges of pollutants to surface waters and require containment of on-site wastewater, including contaminated runoff.

5.4 POTENTIAL WATER TRANSFERS

Regarding nonpoint sources of bacteria in the Imperial Valley, the acreage under cultivation in the Valley has remained and is projected to remain relatively constant at approximately 480,000 acres. However, it is expected that IID irrigation deliveries may decrease as much as 300,000 ac-ft/yr because of a potential water transfer from IID to San Diego County Water Authority. The water to be transferred would be irrigation water “conserved” by IID and Imperial Valley farmers. Using the ratio of the New River flow at its Delta with the Salton Sea to the total outflow of New-Alamo Rivers-IID Drains system, and assuming that the 300,000 ac-ft/yr reduction in irrigation deliveries will result in an equal decrease in total drain flow as a worst case scenario, the corresponding flow in the New River would be about 300,000 ac-ft/yr. However, dilution is not a factor in this TMDL. In any event, the IID and San Diego County Water Authority are preparing an EIS/EIR to address potential environmental impacts resulting from their proposed water transfer.

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6. LINKAGE

The linkage analysis involves the establishment that given certain controls on loads through the load allocations section, the desired target will be reached and beneficial uses will be protected. Such information is a useful management tool for evaluating the degree and duration of effort required and appropriate mitigative options to achieve the WQO. Additionally, the relationship between source loading and a water body's response, assimilative capacity, is addressed in the linkage analysis.

For this TMDL, there is a one-to-one relationship between the load allocations and targets. That is, for example, a 30-day geometric mean wasteload/load allocation of 200 MPN/100 ml for fecal coliforms at the point of discharge guarantees 200 MPN/100 ml or less in the river. The potential for increased concentration downstream due to the growth and decay dynamics should be more than offset by the dilution that occurs in the New River channel by the agricultural return flows.

The assimilative capacity of the New River can be expressed as the sum of the target and the margin of safety (assimilative capacity = MOS + Target). Spatial analytical data obtained during recent sampling events are quite promising with regards to the river's ability to assimilate fecal bacteria. As the river travels for about 60 miles from the International Boundary to its terminus with the Salton Sea, fecal coliforms concentrations seemingly decrease significantly as illustrated by Table 6.1, on the next page. Several factors account for the decreased concentrations and include in part natural dieoff and dilution by agricultural return flows (tailwater and tilewater) and seepage[16]. Another factor is the dilution provided by effluent from WWTPs that disinfect and the dilution from industrial facilities. Further, weirs (3 installed north of Brawley to control erosion) are increasing the river water dissolved oxygen concentration (Setmire, 1985) and assimilative capacity for fecal bacteria. The aeration structure, located approximately 500 feet downstream of the Evan Hewes Highway, also is increasing the river's assimilative capacity for fecal coliforms. Both the weirs and the aeration structure rapidly mix and re-oxygenate the river. Bacteria respond to the increased oxygen concentration with voracious feeding. Significant bacterial die-off may occur abruptly, when the food supply is depleted and/or sudden changes in dissolved oxygen (USEPA, 1986; Thomann et al., 1987). Pathogenic microorganisms may respond in a like manner, or become dormant until favorable conditions are encountered. While the temporal variability is currently unknown, it is believed that there will be a direct correlation between water temperature and river assimilative capacity (Pickett, 1997; USEPA, 1986; Mancini, 1978).

Based on the foregoing, because this TMDL is density-based, and because most of the bacterial pollution comes from Mexico and point sources in the Imperial Valley, direct and indirect controls on these sources should result in attainment of the bacterial WQOs and address the impairment they are causing:

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[16] As stated previously, these factors do not necessarily translate in a similar reduction in actual pathogenic concentrations.

1) By directly controlling the bacteria from all the Imperial Valley WWTPs discharging into the New River watershed by establishing bacterial effluent limitations in their NPDES permits that reflect the WLAs, the impairment caused by WWTPs should be resolved.

2) Regarding pollution at the International Boundary, it is expected that the U.S. will coordinate actions with Mexico to disinfect Mexicali's sewage effluent and eliminate remaining sources of raw sewage.

3) Enforcement of the existing general NPDES permit for CAFOs should eliminate these bacterial sources.

These three steps by themselves are expected to result in substantial attainment of the TMDL for the New River and its tributaries, which in turn will significantly reduce the public health threat. Completion of steps 1 through 3, above, is essential before addressing contribution from more diffuse sources or attempting to characterize the mircobiology and other factors (e.g., die-off) influencing the pathogens in the river.

Table 6.1 Bacteria in New River at International Boundary and near Salton Sea

		Fecal Coliforms (MPN/100 ml)		E. coli (MPN/100 ml)	
Location	Month	Geometric Mean	Maximum	Geometric Mean	Maximum
New River at International Boundary	Jan	5,894,450	16,000,000	NA	NA
	Feb	56,671	130,000	48,203	80,000
	Mar	201,882	220,000	137,525	170,000
	Apr	177,686	300,000	60,732	80,000
	May	NA	NA	NA	NA
	Jun	274,572	300,000	169,410	220,000
	Jul	421,716	500,000	205,434	300,000
New River Upstream of the Salton Sea Delta	Jan	9,000	9,000	NA	NA
	Feb	928	20,000	43	20,000
	Mar	2	2	2	2
	Apr	54	40,000	54	40,000
	May	NA	NA	NA	NA
	Jun	200	200	43	200

	Jul	246	500	134	230

7. IMPLEMENTATION PLAN

7.1 LEGAL AUTHORITY AND REQUIREMENTS

7.1.1 INTRODUCTION

The Porter-Cologne Water Quality Control Act, which is contained in Division 7 of the California Water Code (CWC), establishes the responsibilities and authorities of the Regional Water Quality Control Board, including authority and responsibility for regional water quality control and planning. The Regional Board establishes water quality objectives by amending its Water Quality Control Plan for the Colorado River Basin (Basin Plan). It controls pollution from point sources by implementing a variety of full regulatory programs, including the NPDES Program for point sources discharging into waters of the United States. The State's approach to control nonpoint source pollution is contained in the State's "*Plan For California's Nonpoint Source Pollution Control Program*," including "*Volume I: Nonpoint Source Program Strategy and Implementation Plan for 1998-2013 (PROSIP)*" and "*Volume II: California Management Measures for Polluted Runoff (CAMMPR)*" (hereafter referred to as "State NPS Management Plan").

The cornerstone of the State NPS Management Plan is control of nonpoint source pollution by implementing a "three-tiered approach," consisting of implementation of self-determined best management practices (Tier 1), regulatory-encouraged best management practices (Tier 2), and effluent requirements (Tier 3). Sequential movement through the tiers (e.g. Tier 1 to Tier 2 to Tier 3) is not required of the Regional Board. Depending on the water quality impacts and severity of the NPS problem, the Regional Board may move directly to the enforcement actions specified in Tier 3. Also, the Regional Board can choose to implement a combination of water quality control mechanisms from each of the Tiers as well as additional remedies (e.g., enforcement orders) as provided under the CWC.

7.1.2 REQUIRED COMPONENTS OF TMDL IMPLEMENTATION PLANS

In adopting water quality objectives for water quality control (e.g., TMDLs), the Regional Board must adopt an implementation plan for achieving the water quality objectives[17] (CWC § 13242). The implementation plan must include, but needs not be limited to: (1) a description of the nature of actions which are necessary to achieve the water quality objectives, including any recommendations for appropriate action by any entity, public or private; (2) time schedules for actions to be taken; and (3) a description of surveillance to

[17] Also, 40 CFR 130.6(c)(6) requires identification of implementation measures necessary to carry out a Water Quality Control Plan, including financing, the time needed to implement the Plan, and the economic, social and environmental impact of carrying out the plan in accordance with Clean Water Act Section 208(b)(2)(E).

be undertaken to determine compliance with the objectives. The Basin Plan amendment process has been certified by the Secretary for Resources as “functionally equivalent to,” and therefore exempt from, the California Environmental Quality Act (CEQA) requirement for preparation of an environmental impact report or negative declaration and initial study (California Code of Regulations (CCR) Title 14, §15251(g)). However, a CEQA-required Environmental Checklist must be completed.

7.1.3 OVERVIEW OF PROPOSED TMDL IMPLEMENTATION PLAN

Consistent with the aforementioned requirements and the State’s NPS Management Plan, staff is proposing that the Regional Board consider adopting a Basin Plan amendment that establishes the TMDL and includes an implementation plan to achieve compliance with the TMDL. The implementation plan contained in the proposed Basin Plan amendment and discussed herein specifies: (1) implementation actions required of responsible parties and recommended implementation actions for other agencies/organizations; (2) time schedules for actions to be taken; and (3) a description of the monitoring and surveillance to be undertaken to determine progress toward attaining deadlines and milestones. Also, the potential environmental impacts of the proposed Basin Plan amendment are assessed in the CEQA Checklist and the Determination with respect to Significant Environmental Impacts (Attachment 3) prepared as part of this TMDL. Further, pursuant to CWC § 13141 and § 13241, the proposed implementation plan identifies available means for complying with this TMDL; evaluates the economic impacts of implementation of the TMDL; and identifies potential sources of funding for pollution control (Section 7.8 of this document).

Essentially, this Implementation Plan describes the actions slated for implementation in two phases. Phase I consists of actions to be accomplished between 2001 and 2004 and focuses on controlling pathogenic sources associated with the discharge of wastewater in the US and at the International boundary. It also relies on confined animal feeding operations (CAFOs) to maintain compliance with an existing board order regulating the design of containment structures for their operations. There are two separate but complimentary montiroring activities to TMDL implementation and overall water quality improvements: (1) monitoring activities to be conducted by the responsible parties (mainly wastewater treatment plants and CAFOs); and (2) monitoring and surveillance activities to be conducted by Regional Board staff. The flowing paragraphs describe these activities as well as lists agencies providing financial and technical assistance related to project development. Upon conclusion of Phase I implementation activities, if the water quality targets are not achieved, Phase II will begin and extend from 2004 to 2007. Phase II requires further assessment of bacterial contributions from sources not addressed in Phase I and requires the development of implementation mechanisms designed to control these sources. The dual phase approach allows for immediate control of major sources while allowing time for monitoring to provide analytical basis for Phase II planning.

7.2 RESPONSIBLE PARTIES

All dischargers of waste are responsible for the quality of their waste and are responsible for ensuring that discharges do not adversely impact the beneficial uses of waters of the State. For the purposes of this TMDL, dischargers include owners and operators of NPDES facilities and owners and operators of NPDES CAFOs. The U.S. Section of the International Boundary and Water Commission and the United States Environmental Protection Agency are also responsible parties for the purpose of ensuring that discharges from Mexico do not violate the TMDL.

7.2.1 NPDES WWTP DISCHARGERS

Currently, there are eight (8) Wastewater Treatment Plants (WWTPs) that have NPDES permits to discharge treated domestic wastewater into the New River and its tributaries. The owners and operators of these facilities are jointly identified in the permits as "discharger." The facility names and discharge location are shown in Table 7.1, below.

Table 7.1 NPDES WWTP Dischargers

Discharger Name	Facility Name	Facility Address
City of Calexico	City of Calexico WWTP	298 East Anza Road **Calexico, CA 92231**
State Department of Corrections	Centinela State Prison WWTP	2302 Brown Road Imperial, CA 92251
United States Navy Department	El Centro Navy Air Station WWTP	Public Works Office, Building504, El Centro, CA 92243
City of Westmorland	City of Westmorland WWTP	295 Martin Road Westmorland, CA92281
Seeley County Water District	Seeley County Water District WWTP	1898 West Main Street Seeley, CA 92273
City of Brawley	City of Brawley WWTP	5015 Best Road Brawley, CA 92227
Date Gardens Mobile Home Park	Date Gardens Mobile Home Park WWTP	1020 West Evan Hewes Hwy. #41, El Centro, CA 92243
Imperial County	McCabe Union High School District WWTP	701 West McCabe Road El Centro, CA 92243

7.2.2 NPDES CAFO DISCHARGERS

There are nine (9) CAFOs, which are covered under the General NPDES Permit and General Waste Discharge Requirements for CAFOs. The owners and operators of these facilities are jointly identified in the permits as "discharger." Table 7.2, below, lists these facilities.

Table 7.2 NPDES CAFO Dischargers

Discharger Name	Facility Name	Facility Address
Meloland Cattle Co.	Brandenberg Feed Yard	903 West Highway 98, Calexico
Pioneer Livestock Inc.	Cameiro Heifer Ranch	195 West Corey Road, Brawley
El Toro Land & Cattle Co., Inc	El Toro Land and Cattle Co., Inc.	96 East Fawcett Road, Heber
Phillips Cattle Co., Inc.	Jackson Feedlot	495 West Heber Road, El Centro
Cattlemen's Feed & Milling	Meloland Cattle Co.	907 Brockman Road, El Centro
Phillips Cattle Co., Inc.	Phillips Cattle Co., Inc.	910 Nichols Road, El Centro
Phillips Cattle Co., Inc.	New River Cattle Feeders, Inc.	420 West Kubler Road, Calexico
Max Ruegger Ruegger and Ruegger	Ruegger and Ruegger Feedlot	604 Bannister Road, Westmorland
Kuhn Farms Dairy	Kuhn Farms Dairy	1870 Jeffery Road, El Centro

7.2.3 THE UNITED STATES GOVERNMENT

The IBWC is a US-Mexican federal agency with roots in the "Treaty of Guadalupe Hidalgo of Peace, Limits and Settlement," which was signed by both Countries in February 1848. IBWC was established as the "International Boundary Commission" (IBC) in 1889 to deal with boundary issues. In 1944, the US and Mexico signed the Treaty entitled "Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande" (a.k.a. the "Mexican-American Water Treaty"), which was ratified by the US Congress in 1945. The Mexican-American Water Treaty changed the name of IBC to IBWC and expanded the jurisdiction and responsibilities of the IBWC[18]. The US Section of the IBWC is part of the State Department. The IBWC's jurisdiction extends along the boundary and inland into both countries where the two countries have constructed international projects. Its responsibilities include the application of boundary and water treaties and settling differences that may arise in their application. The treaty specifically charged the IBWC with the solution of border sanitation problems and other border water quality problems.

In August 1983, the Presidents of Mexico and the United States signed the La Paz Agreement for protection and improvement of the environment in the border area. The La Paz Agreement makes the USEPA ithe US coordinator for pursuing practical, legal, institutional and technical measures for protecting the quality of the environmental in the border area. The agreement originally made the Mexican Secretaría de Desarrollo Urbano y Ecologia (SEDUE) the coordinator for Mexico. In 1992, Mexico transferred responsibility for border problems to the Secretaría de Desarrollo Social (SEDESOL). Currently, the Comision Nacional del Agua (CNA) has primary responsibility for border water problems for Mexico.

Based on the foregoing, the State Department's IBWC and the USEPA have primary responsibility for ensuring that discharges of wastes from Mexico do not cause or contribute to a violation of this TMDL. From a practical perspective, to attain this TMDL Mexicali's sewage effluent must be disinfected and Mexicali's sources of raw sewage eliminated. This will require Mexico's cooperation and U.S. assistance. Mexico's present laws do not require disinfection of WWTP effluent and sewage discharges to receiving waters like the New River.

7.3 THIRD PARTY COOPERATING AGENCIES AND ORGANIZATIONS

This subsection describes the key cooperating agencies and organizations, and the role they can play in TMDL implementation. Cooperating third party agencies and organizations can play a pivotal role in attaining TMDLs. These entities may have technical expertise, resources, and organizational structures that will facilitate effective implementation of practices to address bacteria pollution.

7.3.1 NEW RIVER/MEXICALI SANITATION PROGRAM BINATIONAL TECHNICAL ADVISORY COMMITTEE

Cooperation from Mexico at all levels is essential to effectively address New River pollution from sources south of the border. The IBWC has been working with its Mexican Counterpart (CILA) and other federal and state agencies on both sides of the border, including the Regional Board, to address New River water quality problems at the International Boundary. Specifically, in October 1992, IBWC and CILA signed Minute No. 288 titled Conceptual Plan for the Long Term Solution to the Border Sanitation Problem of the New River at Calexico, CA - Mexicali, Baja California. Minute No. 288 established

[18] Both the United States and Mexico have commissioners appointed to IBWC. Within Mexico, IBWC is called "Comision Internacional de Limites y Aguas" (CILA).

short- and long-term solutions for the sanitation of the New River at the International Boundary. These short-term measures, dubbed the "Quick Fixes," were completed in 1999 and designed for compatibility with the long-term solution and were funded through a cost sharing agreement between both countries. The U.S. and Mexico have contributed 55% and 45% respectively, of the total cost of $7.5 million for the Quick Fixes, which were implemented by a Binational Technical Advisory Committee (BTAC). The BTC members are:

Mexico	U.S.
• CILA (IBWC, Mexican Section)	• IBWC
• CNA (National Water Commission)	• USEPA
• CESPM (State Public Services Commission of Mexicali)	• SWRCB
• SAHOPE (Secretary of Human Settlements and Public Works)	• Regional Board
• Municipality of Mexicali	• Imperial County
	• Imperial Irrigation District

The BTAC has led to improved communication and technology transfer between the two countries. CalEPA's agencies, particularly the SWRCB and Regional Board, remain committed to continue working with the U.S. Government and local agencies in Imperial County; and with federal, state, and local Mexican officials in Baja California to address New River pollution problems.

7.3.2 THE CITIZEN CONGRESSIONAL TASK FORCE ON THE NEW RIVER (CCTF)

The CCTF, is coordinating with the US Bureau of Reclamation (USBR), constructed two wetlands in Imperial County that treat polluted agricultural drain waters and New River water. The County of Imperial and the CCTF partnered to receive a 1998 Clean Water Act (CWA) 319(h) Grant to partially fund this project. The non-profit Organization Desert Wildlife Unlimited, Inc., heads the CCTF. The Imperial Irrigation District is providing matching in-kind funds and donating land for the wetlands. Additionally, Congress, through the USBR, allocated $3 million for construction of the wetlands. While these pilot projects are focused on remediating silt, pesticides, and selenium pollution in the agricultural drain water and the New River, the projects also include comprehensive water quality monitoring of influent/effluent waters, and invertebrate, biota, plant, bacteria, and wildlife studies of the wetlands. The water quality data will serve to evaluate the effectiveness of the wetlands in addressing overall New River and drain water pollution, and to track overall New River pollution. The data will also guide design modifications.

7.3.3 NORTH AMERICA DEVELOPMENT BANK (NADBank)

The North American Free Trade Agreement (NAFTA) created the NADBank, a bilaterally funded, international organization, in which Mexico and the United States participate as equal partners. The NADBank is headquartered in San Antonio, Texas, and charged to serve as a lead financier for public entities seeking financing for environmental infrastructure projects in the border region. It can assist border communities to identify available sources of funds (e.g., grants) and to design appropriate financial plans for wastewater infrastructure projects. Services provided by the NADBank include:

- Participation in bond issues
- Interim Financing
- Grant resources and government budget allocations through the Border Environment Infrastructure Fund (BEIF)
- Loan Guaranties
- Technical Assistance via its sister agency the Border Environment Cooperation Commission (NADBank, 2000)

7.3.4 BORDER ENVIRONMENT COOPERATION COMMISSION (BECC)

The BECC was also created by NAFTA and is a binational organization with headquarters in El Paso, Texas, and Ciudad Juarez, Mexico. The BECC has established a Technical Assistance Program to assist eligible border communities with preliminary engineering and design studies to develop projects that address their environmental problems, achieve BECC certification for the projects, provide grants to communities for technical assistance, and assist the communities in obtaining BECC certification—a prerequisite to eligibility for funding consideration from the NADBank and/or other sources. Funding for projects under the Technical Assistance Program comes from the USEPA (BECC, 2000).

7.3.5 CALIFORNIA ENVIRONMENT COOPERATION COMMISSION (CALBECC)

In 1994, the Governors of California, Baja California, and Baja California Sur created the California Border Environment Cooperation Commission to identify and promote environmental infrastructure projects along the Border, establish Border priorities, and solicit funding for the projects. CalBECC can assist the owners of the aforementioned WWTPs to solicit funding to install disinfection facilities to comply with this TMDL.

7.3.6 UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION, HOLTVILLE FIELD STATION

The University of California Cooperative Extension (UCCE) was developed to apply the resources of the university to local communities. It offers workshops, programs, and technical assistance to growers on a broad range of agricultural topics, including conservation management practices. UCCE farm advisors conduct research on existing local problems, and extend that information, along with other related research, to local stakeholders. The UCCE's Holtville Field Station can conduct demonstration projects and research for preventing/mitigating potential water quality impacts that may result from the application of manure to farmland and to assist CAFOs. It has the organizational structure to provide training courses and workshops, and could serve as a technical assistance agency for interested stakeholders.

7.3.7 UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE (NRCS)

The Natural Resources Conservation Service (NRCS) is a Federal Assistance Agency. Its staff can provide technical assistance and aid in securing financial assistance to support the implementation of management practices. The NRCS is assisting NPDES CAFOs to develop the plans and specifications for providing the containment prescribed by the General NPDES permit for CAFOs. It can also assist in dealing with currently unregulated CAFOs.

7.4 ACTIONS TO BE IMPLEMENTED BY DISCHARGERS IN THE U.S.

This Section describes the regulatory approach that the Regional Board will use to achieve the TMDL. It also describes the nature of actions that are required to be taken by designated responsible parties. Further, it describes the actions that cooperating third parties have agreed to undertake to facilitate the attainment of TMDL allocations through a self-determined process. And finally, it describes actions that responsible parties need to implement under self-determined, regulatory-encouraged, or full regulatory compliance with the TMDL.

7.4.1 WASTEWATER TREATMENT PLANTS

All WWTPs and point source facilities discharging, potentially discharging, or proposing to discharge wastes with bacteria into the New River and/or surface water tributaries to the New River are expected to provide adequate disinfection to meet the WLAs specified in Table 5.1 (p. 35) and discharge pursuant to the NPDES permits. They are also expected to monitor and report on the quality of their discharge as required by their permits.

<u>NPDES WWTPs With Disinfection Capabilities</u>—The Regional Board will continue to enforce the NPDES permits for the City of Calexico and for the State of California Department of Corrections Centinela Prison so that they remain in consistent compliance with their NPDES permit, including the bacteriological effluent limits specified in their respective permits. The Regional Board Executive Officer issued Time Schedule Order (TSO) No. 98-075 against the Navy Air Station, El Centro, because the Navy has been in violation of its NPDES Permit, in particular in violation with the bacterial effluent limits of the permit. The Navy reported on March 28, 2000, that it obtained emergency funding to upgrade its WWTP to achieve compliance with the permit. It also reported in June 2000 that its disinfection system, and in general its WWTP, are fully operational. In July 2000, the

Executive Officer also issued two Administrative Civil Liability Complaints (ACLC) against the Centinela Prison. The Department of Corrections paid the ACLCs. These facilities are also expected to continue to monitor and report the quality of their effluent as prescribed by their permits, including bacterial quality.

NPDES WWTPs Without Disinfection Capabilities—Currently, there are five (5) NPDES permitted facilities discharging undisinfected municipal wastewater into the New River: Seeley County Water District (SCWD), Date Gardens Mobile Home Park (DGMHP), City of Brawley, City of Westmorland, and McCabe Union School District (MCUSD). Both the City of Westmorland and City of Brawley have been issued Time Schedule Orders requiring them to upgrade their WWTPs by January 2002 and March 2002, respectively. Both entities are currently securing financing from the NADBank to expand their plants. Also, the City of Westmorland has secured financing from the United States Department of Agriculture to upgrade its WWTP. Neither the TSO nor the NPDES permits for Westmorland incorporates requirements for disinfection. In June 2000, the Regional Board adopted an updated NPDES permit for Brawley. The updated permit prescribes effluent disinfection limits that become effective in 2002. This Implementation Plan requires that the remaining four facilities also provide adequate disinfection to meet the bacterial WQOs no later than June 30, 2004. Therefore, this Implementation Plan requires that each of the existing NPDES permit for these four facilities be revised to incorporate the WLAs prescribed in Table 5.1 and to include monitoring and reporting requirements for the WLAs, in accordance with the time schedule shown by Table 7.3, below. Further, the Implementation Plan requires that time schedule orders (TSOs) be issued for Westmorland, SCWD, DGMHP, and MCUSD requiring them to submit plans, specifications, and steps to be taken to secure funds to comply with their WLAs. Table 7.3, below, outlines the schedule for implementation.

Table 7.3 Implementation Tasks and Schedules for WWTPs Discharging Undisinfected Effluent

Facility Name	NPDES Permit No.	Expiration Date	Revision Date	TSO Issuance Date	Compliance with WQOs
City of Westmorland WWTP	CA0105007	1/28/03	9/15/01	9/15/01	6/30/04
Seeley County Water District WWTP	CA0105023	6/25/02	9/15/01	9/15/01	6/30/04
Date Gardens Mobile Home Park WWTP	CAO104841	9/24/02	9/15/01	9/15/01	6/30/04
McCabe Union School District WWTP	CA0104281	11/29/00	9/15/01	9/15/01	6/30/04

7.4.2 CONFINED ANIMAL FEEDING OPERATIONS (CAFOS)

Order No. 01-800 (see Appendix D) prescribes on-site containment of all wastewater generated from a CAFO facility, including projected precipitation on and drainage through manured areas resulting from a 24-hour storm with a 25-year return frequency. The Order also specifies minimum construction standards for containment structures (i.e., ponds), including minimum soils permeabilities and composition and minimum separation between pond bottoms and upper most encountered groundwater. Moreover, regarding stormwater flows in excess of the 25-year, 24-hour storm event, the Order provides that such flows may be discharged to surface waters only in compliance with USEPA's "Effluent Guidelines and Standards for Feedlot's, 40CFR Part 412". Further, the Order requires these dischargers to submit an Engineered Waste Management Plan (EWMP) with design calculations addressing compliance with the Order. CAFOs are expected to remain in full compliance with Board Order No. 01-800 (General National Pollutant Discharge Elimination System (NPDES) Permit and General Waste Discharge Requirements for Confined Animal Feeding Operations). Several CAFOs have not submitted the Engineered Waste Management Plan required by Order No. 01-800. To prevent and eliminate water quality impacts from the CAFOs, Order No. 01-800 requires the owners/operators of the CAFOs, who have not submitted the EWMP, submit an EWMP by 2001. It also requires new CAFOs to submit and implement the EWMP within 90 days from the date the begin operations and within 90 days following EWMP approval, respectively. Compliance with the Order will be enforced by one of the Regional Board's Regulatory Units.

7.5 ACTIONS TO BE IMPLEMENTED BY THE U.S. GOVERNMENT

The IBWC identified a series of sewage infrastructure projects for Mexicali I and Mexicali II service areas to address New River pollution. The Mexicali I projects essentially consist of the replacement/rehabilitation of about 44,000 feet of sewage pipes, rehabilitation of sewage pump stations, and expansion of the Mexicali I wastewater treatment plant to 30 mgd. The Mexicali II projects entail the construction of a new 20-mgd wastewater treatment plant (a.k.a. Mexicali II WWTP), the sewage Pumping Plant No. 4 for the new WWTP, installation of telemetry equipment for the WWTP and pumping plants, construction of 31,170 feet of discharge forcemain[19] for Pumping Plant No. 4, construction/rehabilitation of about 96,000 feet of sewer lines, and rehabilitation of two sewage lift stations. In November 1999, the NADBank developed a financing plan for the projects. The NADBank submitted the plan to USEPA and the Mexican Government for approval. USEPA approved the Plan early this year, and Mexico signed the plan in June 2000. The plan includes Federal, State, and local funds to pay for project costs. These projects are finally underway and have an estimated cost of $50 million dollars. It is

[19]CNA is responsible for this project. As of December 1997, a CNA contractor had already installed approximately 1.5 miles of the force main, a 54-inch steel pipe. However, as of January 1998, the project has been on hold reportedly due to problems between CNA and its contractor.

expected that the above-referenced projects will improve the overall quality of the New River. However, as stated previously, neither the existing nor the new wastewater treatment facilities include disinfection capabilities, there are significant number of unregulated point and nonpoint sources of bacteria which discharge directly into the New River watershed in Mexicali, and an unknown number of raw sewage bypasses—all of which are not addressed by the certified projects. Therefore, the projects by themselves will not result in attainment of the TMDL downstream of the border. Consequently, it is necessary for the State Department's IBWC and the USEPA to take additional steps to ensure that discharges of wastes from Mexico do not cause or contribute to a violation of the TMDL. Therefore, pursuant to Section 13225 of the California Water Code, the U.S. Section of the IBWC and the USEPA are requested to take the actions listed in Table 7.4, below:

Table 7.4 Implementation Tasks and Schedule for the U.S. Government

Task	Date for Implementation
1. Submit a technical report to the Regional Board with proposed measures (e.g., plans and specifications for disinfection facilities) to ensure that discharges of wastes from Mexico do not cause or contribute to a violation of this TMDL. The report must specify the parties responsible for implementation of the measures and include a time schedule for implementation	December 30, 2001
2. Submit a report identifying financial options for implementation of the measures discussed in Item 1, above.	June 30, 2002
3. Complete implementation of measures.	June 30, 2004
4. Submit monthly progress reports to the Regional Board regarding progress towards completion of the measures.	By the 15th day of every Month, with the first report due by September 15, 2001

7.6 WATER QUALITY IMPROVEMENT GOALS

For Phase I of this TMDL, the main goals are that:

- All NPDES WWTPs provide effluent disinfection within three years following approval of this TMDL such that the impairments they are causing are resolved; and
- The U.S. Government substantially reduce the public health threat of the New River at the International Boundary by ensuring that municipal discharges of wastes into the New River watershed in Mexicali are adequately disinfected and that all raw sewage discharges to the New River are eliminated.

The Regional Board believes that these two measures alone will result in attainment of the TMDL. This notwithstanding, during Phase II of this TMDL and based on the characterization of the pathogen contribution from nonpoint sources and the monitoring results for the New River, staff will begin to develop measures as necessary to deal with the residual bacterial pollution from nonpoint sources in the U.S. and at the International Boundary.

7.7 MONITORING FOR REFINEMENT OF SOURCE ANALYSIS AND TMDL IMPLEMENTATION

This subsection describes the monitoring and surveillance actions to be undertaken by the Regional Board to refine the Source Analysis and measure compliance with the TMDL. Tracking TMDL implementation, monitoring water quality progress, and modifying TMDLs and implementation plans as necessary to ensure attainment of water quality standards is important to:

- Address uncertainty that may exist in aspects of TMDL development;
- Oversee TMDL implementation to ensure that implementation is being carried out; and
- Ensure that the TMDL remains effective, given changes that may occur in the watershed after the TMDL is developed.

The Regional Board will implement two types of monitoring: (1) water quality monitoring and (2) implementation tracking.

7.7.1 WATER QUALITY MONITORING

Monitoring activities conducted as part of the New River Bacteria TMDL Monitoring and Tracking Program will be conducted pursuant a Regional Board Quality Assurance Project Plan for monitoring pathogen-indicator organisms in the New River. The QAPP-NR will be developed by Regional Board staff by November 30, 2001 and will include at a minimum a sampling station for the New River at the International Boundary, for the New River at its outlet to the Salton Sea, for a representative number of major and minor agricultural drains in the New River watershed, and for selected areas where other point sources threaten water quality. The objectives of the monitoring program include:

- assessment of water quality standards attainment;
- verification of pollution source allocations;
- calibration or modification of selected models (if any);
- evaluation of point and nonpoint source control implementation and effectiveness;
- evaluation of in-stream water quality; and
- evaluation of temporal and spatial trends in water quality.

Monthly grab samples from the above-mentioned surface waters will be collected and analyzed for the parameters listed below:

- Flow (to be obtained from IID or USGS)
- Dissolved Oxygen
- pH
- Temperature
- Fecal coliform organisms
- E. coli
- Fecal streptococci
- Enterococci

Additionally, discharges from WWTPs will continue to be monitored for fecal coliform and/or E. coli bacteria as part of the NPDES permits for the WWTPs. As testing for enterococci becomes commercially available in the region, it will be made a monitoring requirement.

7.7.2 SURVIELLANCE AND IMPLEMENTATION TRACKING

By November 30, 2001, Regional Board staff will develop a plan to track activities and surveillance conducted as part of this New River Pathogen TMDL. The objectives of Regional Board surveillance and implementation tracking are:

- Assess/track/account for practices already in place;
- Measure the attainment of Milestones;
- Determine compliance with NPDES permits, WLAs, and LAs; and
- Report progress toward implementation of NPS water quality control, in accordance with the SWRCB NPS Program Plan (PROSIP).

7.8 TMDL REVIEW SCHEDULE

Regional Board staff shall present quarterly reports to the Regional Board describing progress toward attainment of milestones. The reports will assess:

- Water quality improvement (in terms of total fecal coliform organisms and E. coli);
- Control measures implemented to deal with pollution originating in Mexico;
- Whether milestones were met on time or at all. If milestones were not met, provide a discussion of the reasons; and
- Level of compliance with measures and timelines of TSOs and Regional Board requests.

7.8.1 TRIENNIAL REVIEW

Section 303 of the Clean Water Act requires that the State hold public hearings for the purpose of reviewing applicable water quality standards (WQS), and as appropriate, modifying and adopting standards. 40 CFR 130 also prescribes this requirement. Further, Section 13240 of the California Water Code requires the State to formulate and periodically review (and update as necessary) regional water quality control plans. Following adoption by the Regional Board, basin plan amendments and supporting documents are submitted to the SWRCB for review and approval. Following the approval of the SWRCB, the State Office of Administrative Law must also review Basin Plan amendments. In addition, the USEPA has approval authority over Basin Plan Amendments.

In order to provide adequate time for implementation and data collection, the first review of the TMDL will be scheduled to conclude three years after the adoption of the TMDL. Subsequent reviews will be conducted concurrent with the Triennial Review of the Basin Plan. The TMDL review schedule is shown below in Table 7.7.

Table 7.5 TMDL Review Schedule

Activity	Date
Adoption	Jun 2001
Begin Review	Jul 2003
End Review (Regional Board Public Hearing)	Feb 2004
Submit Administrative Record to SWRCB	Jun 2004
Begin Review	Jul 2006
End Review (Regional Board Public Hearing)	Dec 2006
Submit Administrative Record to SWRCB	Mar 2007
Etc.	

Public hearings will be held at least every three years to review the Pathogen TMDL as a whole. At these hearings, the Regional Board will:

- review monitoring results,
- review progress toward attainment of milestones,
- consider approval of proposed management practices for the control of pathogens from man-made nonpoint sources of pollution,

- consider enforcement action, and
- consider revision of the TMDL components.

This proposed review schedule indicates the Regional Board's commitment to periodic review of this TMDL, and refinement as necessary via the Basin Plan amendment process.

8. PROPOSED AMENDMENT

Attachment 1 includes a draft Regional Board Resolution to adopt the draft Basin Amendment (Attachment 2) establishing this TMDL and TMDL Implementation Plan.

The draft Basin Plan Amendment:

- Deletes dated information that is no longer accurate
- Establishes a site specific water quality objective for the Alamo River of 200 milligrams per liter of total suspended solids for the entire US length of the River.
- Adds a Section for this TMDL that:
    - Summarizes the "technical" TMDL elements, including the Problem Statement, Numeric Target, Source Analysis, Margin of Safety, Seasonal Variation/Critical Condition information, Loading Capacity, and Allocations
    - Establishes numeric targets
    - Designates Responsible Parties and Management Actions
    - Describes the recommended actions for cooperating agencies
    - Describes compliance assurance and enforcement activities for this TMDL
    - Describes Regional Board monitoring, tracking, and assessment activities to monitor the implementation of this TMDL
    - Describes the public reporting activities for this TMDL
    - Describes the Regional Board review process for this TMDL.

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9. ENVIRONMENTAL CHECKLIST

9.1 CEQA SUMMARY

The Secretary of Resources has certified the basin planning process as exempt from certain requirements under the California Environmental Quality Act (CEQA), including preparation of an initial study, a negative declaration and environmental impact report [Title 14, California Code of Regulations, Section 15251(g)]. As this proposed amendment to the *Basin Plan* is part of the basin planning process, the amendment is considered 'functionally equivalent' to an initial study, a negative declaration and an environmental impact report. Included in the 'functionally equivalent' amendment are: New River Pathogen Total Maximum Daily Load; Draft Resolution; Basin Plan Amendment; CEQA Checklist; and Economic Analysis of the New River Pathogen TMDL.

The CEQA Checklist (Contained in Attachment 3) notes that the impacts associated with the Basin Plan amendment are less than significant with mitigation. The CEQA discussion accompanying the Checklist (Contained in Attachment 3) summarizes the types of impacts that may occur as a result of the implementation of sediment control measures. As the implementation program is developed, the Regional Board will amend the Basin Plan and consider any impacts associated with resulting amendments.

9.2 ALTERNATIVES TO PROPOSED PROJECT

The following paragraphs provide a discussion regarding alternatives to the proposed project (i.e., proposed Basin Plan amendment and TMDL), including discussions on the rationale for the proposed alternative, the "No Action Alternative," and variations to the proposed alternative.

9.2.1 THE PROPOSED ALTERNATIVE

The proposed New River Pathogen TMDL is a reasonable and feasible approach to decrease existing enteric bacteria densities to a level that are associated with acceptable health risks for water contact recreation. The TMDL contains bacteria numeric targets, based on federal Bacteria Water Quality Criteria, that presently are expected to attain and maintain designated beneficial uses, and eliminate existing water quality impairments and public health threats. The proposed time schedule outlined in the TMDL implementation plan requires compliance within a three-year period. Such a time schedule is moderately aggressive, yet reasonable and was established taking into account the ability of responsible parties to implement tasks and pollution severity. The time schedule provides the responsible parties with the necessary time to explore financial options and undertake supplemental CEQA studies, as the situation warrants.

9.2.2 NO ACTION ALTERNATIVE

The "No Action" alternative implementation would involve no action by the Regional Board to adopt this TMDL, including implementation measures and monitoring program. This alternative does not comply with the CWA or meet the purpose of the proposed action, which is to eliminate ongoing violations of the Basin Plan water quality standards, water quality impairments, and public health threats.

9.2.3 OTHER ALTERNATIVES

Alternatives to the proposed Basin Plan amendments and TMDL essentially fall into three categories: (1) alternate deadlines for achieving the TMDL, and (2) alternative numeric targets. A combination of these two is also possible. Regarding alternate deadlines for compliance, a more stringent schedule (e.g., requiring compliance immediately after adoption of the TMDL or within a year thereafter) is not realistic as the schedule would not afford the owners and operators of the affected WWTPs and the U.S. Government the opportunity to undertake the necessary planning and studies to evaluate which is the most effective way to ensure compliance with the TMDL. A more relaxed deadline (e.g., 5 years) is not acceptable because it fails to resolve the water quality impact at the earliest practicable date, which is at the heart of the TMDL process.

Implementation of alternative numeric targets could consist of targets that are less stringent or more stringent than the proposed ones. These options were considered and judged to be unacceptable for this phased TMDL. In the absence of an extensive and long-term scientific investigation (e.g., risk analysis) to establish less stringent bacteria water quality objectives, less stringent objectives would only increase the threat to public health. Such an investigation would also only prolong the impaired state of the New River and possibly the Salton Sea itself. Similarly, considering the degree of bacterial pollution, more stringent objectives at this time would only place an unnecessary economic hardship to the responsible agencies/parties because they would have to implement additional wastewater treatment to comply with more stringent standards.

10. ECONOMIC CONSIDERATIONS

10.1 ESTIMATED COSTS FOR IMPLEMENTING THE TMDL AND POTENTIAL SOURCES OF FUNDING

Section 13241(d) of the California Water Code requires that the Regional Board consider economics in promulgation of WQS. Also, Section 13141 of the Porter-Cologne Water Quality Control Act requires the Regional Board to estimate the cost of any agricultural water quality control program prior to requiring its implementation, and to identify funding sources. This TMDL does not establish any new requirements or standards for agriculture.

10.1.1 COST TO WWTPs

Regional Board staff has prepared TMDL compliance annual cost estimates for the NPDES WWTPs discharging treated but undisinfected wastewater into the New River and/or its tributaries. The costs have been reviewed by the State Water Resources Control Board (State Board), Division of Clean Water Programs, at the request of the State Board's Economics Unit (see Attachment 4). The costs are presented in Table 10.1, below.

Table 10.1 Potential Costs for NPDES WWTPs

Waste Water Treatment Facilities - Daily Amounts and Annual Costs[20]					
	McCabe School	Date Gardens	Seeley	West-moreland	Brawley
Avg. Daily Flow (gal/day)	1,500	11,000	15,000	225,000	4.2 million
Pk. Daily Flow (gal/day)	4,500	22,000	30,000	500,000	8.4 million
Total Capital Cost	$100,000	$100,000	$250,000	$500,000	$1,000,000
Amortized Capital Cost	$8,700	$8,700	$21,800	$43,600	$87,000
Annual O&M Cost	$12,000	$15,000	$20,000	$24,000	$90,000
Total Annual Cost	$20,700	$23,700	$41,800	$67,600	$177,000
Monitoring Costs[1, 2] (Fecal coliform and E. Coli)	$2,400	$2,400	$2,400-$3,000	$2,400-$3,000	2,400-$3,000

Notes:

[1] Estimates provided by Trojan, Inc.

[2] Minimum cost based on collection of five samples per month for fecal and E. coli analyses.

[20] Costs for Westmorland and Brawley are included for comparison purposes only. Each of these two Cities prepared and certified CEQA documents to upgrade/expand their WWTPs to provide disinfection.

10.1.2 POTENTIAL SOURCES OF FUNDING

Potential sources of funding for these facilities include the NADBank, a bilaterally funded, international organization, in which Mexico and the United States participate as equal partners. The NADBank serves as a lead financier for public entities seeking financing for environmental infrastructure projects in the border region. It can assist border communities to identify available sources of funds (e.g., grants) and to design appropriate financial plans for wastewater infrastructure projects. Services provided by the NADBank include:

- Participation in bond issues
- Interim Financing
- Grant resources and government budget allocations through the Border Environment Infrastructure Fund (BEIF)
- Loan Guaranties
- Technical Assistance via its sister agency the Border Environment Cooperation Commission (NADBank, 2000)

Other potential sources of funding are:

1. Private financing by individual sources.
2. Bond indebtedness or loans from government institutions.
3. Surcharge on sewer users
4. State and/or Federal low-interest loans
5. State Proposition 13 (Costa-Machado Act of 2000) grant funds
6. Single purpose appropriations from Federal and/or state legislative bodies.

10.1.3 COST TO U.S. GOVERNMENT AND POTENTIAL FUNDING SOURCES

In 1987, James M. Montgomery, Consulting Engineers, Inc., prepared cost estimates for building a recommended wastewater treatment plant for "in-stream" treatment of the entire New River flow (approximately 230 cfs) at the International Boundary (J.M. Montgomery, 1987). The recommended plant consists of headworks, extended aeration, and chlorination facilities. The costs are as follows:

	(in 1987 dollars)	(in 2000 dollars)*
Capital	$41,000,000	$55,965,000
O&M	$2,500,000-$3,000,000	$3,412,500-$4,095,00

* Estimated, since final inflation rates have not been published yet for fiscal year 2000.

Also, Regional Board staff has evaluated two treatment alternatives for disinfecting the municipal wastewater flow from the current and proposed lagoon systems in Mexicali. The first of these is a hypochlorite type of chlorine application and the second is a gaseous chlorine type facility. Table 10.2, below, provides the estimated costs.

Table 10.2 Potential Costs for Disinfection of Mexico's Wastewater

	Alternative A Hypo-chlorite	Alternative B Gaseous Chlorine
Capital Costs	$625,000	$1,250,000
Operation & Maintenance Costs (per year)	$730,000	$243,000

The capital costs are average figures that the consulting firm of CH2M Hill has used recently for the construction of similar facilities in the United States. Additionally, they do not include any land acquisition costs, but land requirements would be minimal as the disinfection facilities can be built on the existing footprints of the exiting and proposed lagoons. One of the primary factors that will affect the treatment cost for these alternatives is the cost of chlorine, which of course is dependent upon the anticipated (design) dosage amount. The values in the table below were obtained by assuming a dosage amount of 20 mg/l of chlorine (at $0.55-$0.60/lb). In order to obtain the required dosage amount, a study needs to be undertaken of the effluent of the treatment plant, as many factors may affect the dosage amount (i.e. amount of algae present).

Disinfection of the entire New River flow in the U.S. is not recommended because of the magnitude of such an effort and safety issues. Disinfection of Mexicali's WWTP effluent is more practical and effective.

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